THE IRON AGE

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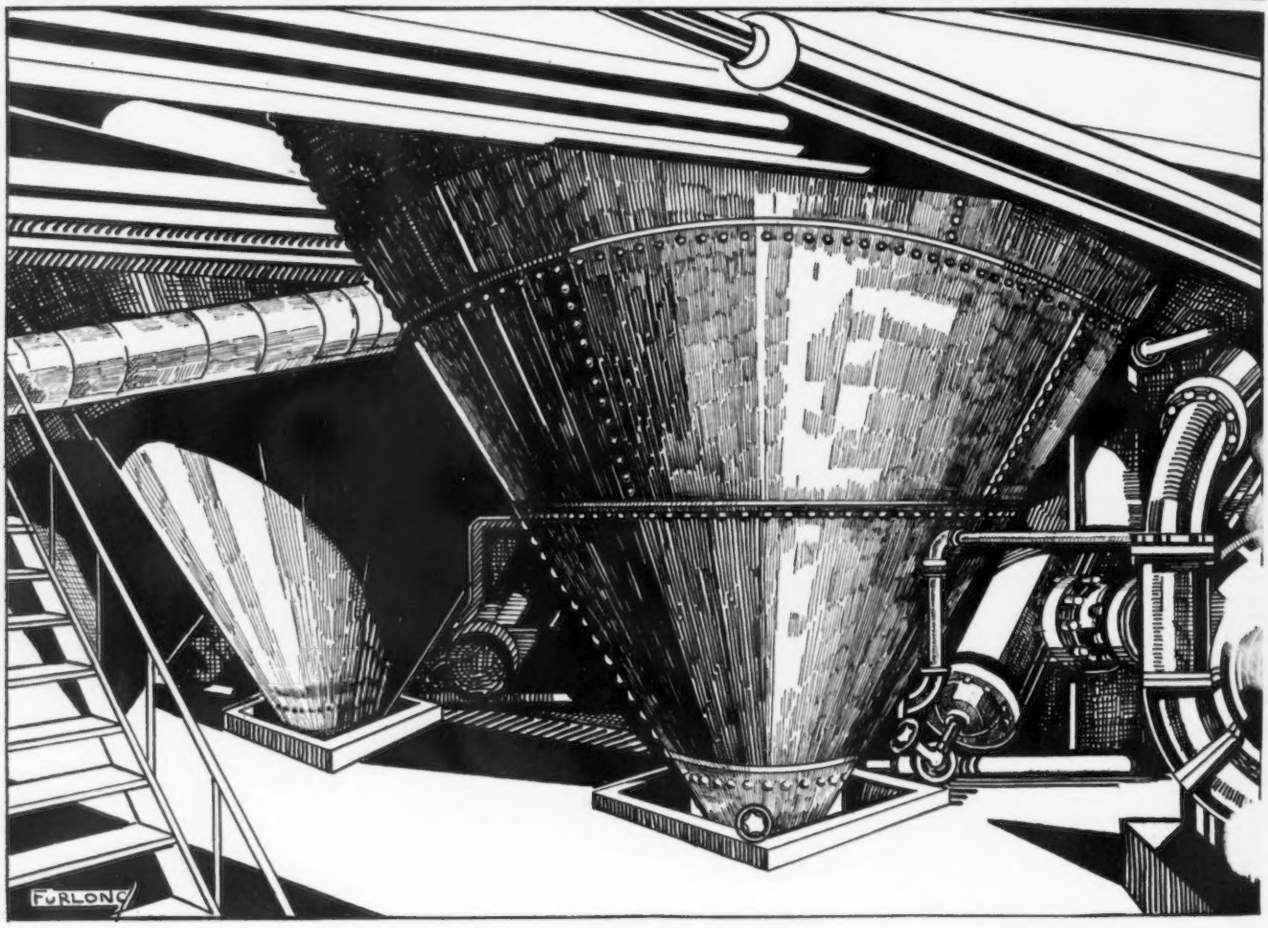

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JANUARY 17, 1935

ESTABLISHED 1855 Vol. 135, No. 3

Industry and Social Security

THERE is a mistaken and unfair impression abroad in this country that employers do not favor the objective of social security.

Among all of the many hundreds of industrialists we have known, we cannot think of a single one who has wanted, or who has tried, to keep his workers "down." All of these employers, of course, make every effort to keep unit labor costs down, as well as all other items of unit cost of product so that they may stay in business. But there is a wide distinction, not always recognized, between a concern's policy with regard to labor wages and its policy with regard to labor costs.

The so-called Ford idea of paying the highest possible wage rates and striving for the lowest possible unit labor costs is not confined to the automobile industry. It is accepted as sound policy, and practiced, in all branches of the metal-working industry, including, of course, the making of steel. Common sense tells us plainly that unless unit labor costs are low, it is impossible to pay high wages. Labor inefficiency penalizes the worker first and most.

In striving for low unit labor costs, in combination with the highest practical wage rates, American industry has been working in the most effective way possible toward social security, not only for the workers but also for the consuming public.

But this is only part of the story. Farsighted employers of their own volition have initiated and inaugurated practically all of the so-called "security" activities which are being given a present-day, New Deal trademark.

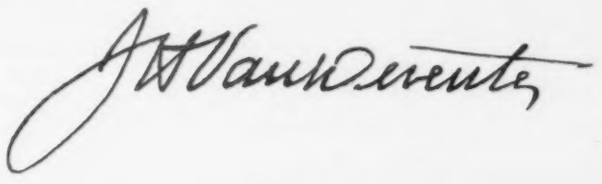
Private initiative, not legislation, nor labor unions, nor social reformers, introduced in America the old age pension idea for workers. Last year, the United States Steel Corpn., one of the many companies operating pension plans, expended close to nine million dollars for this purpose.

Private employers initiated and put into effect unemployment compensation for workers in individual plants long before the Wisconsin Plan or the Ohio Plan or any other State or Federal plan was thought of.

Private industry recognized the emergency expediency of the work-spreading idea and put it into practice, long before politicians and labor leaders, so-called, began to clamor for a shorter work week.

Private employers, in every part of this country, aided their depression stricken workers by donations of food, clothing and money, long before Federal, State or local governments began to shoulder the burden of relief.

Let's get this straight once and for all. Private industry places just as high a value upon the objective of social security as does any sincere or any self-seeking "friend of the worker." It has demonstrated this by the expenditure of many millions of private dollars. Industry's present concern is that the courses taken to achieve security shall not increase insecurity.



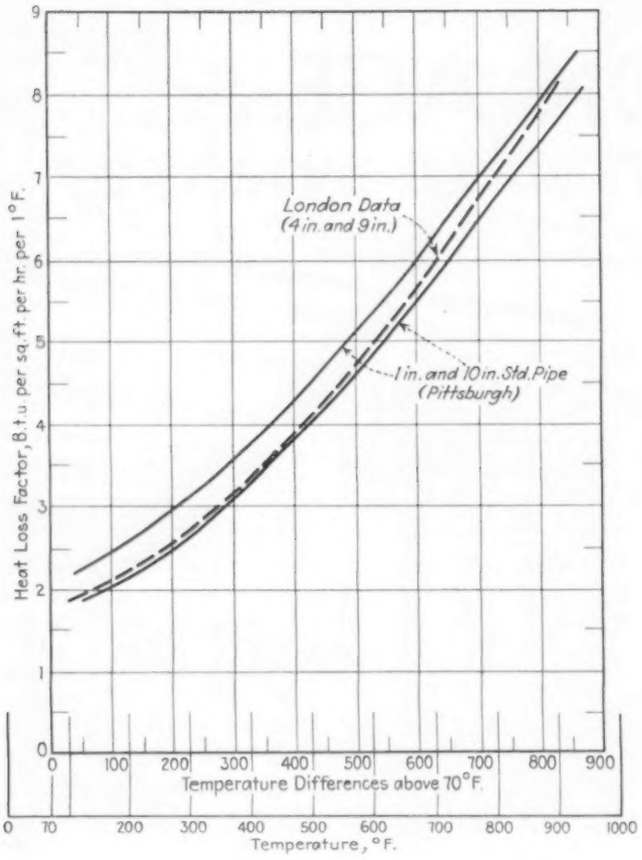
Heat and Cold Ins

o o o

BY JOSEPH F. SHADGEN

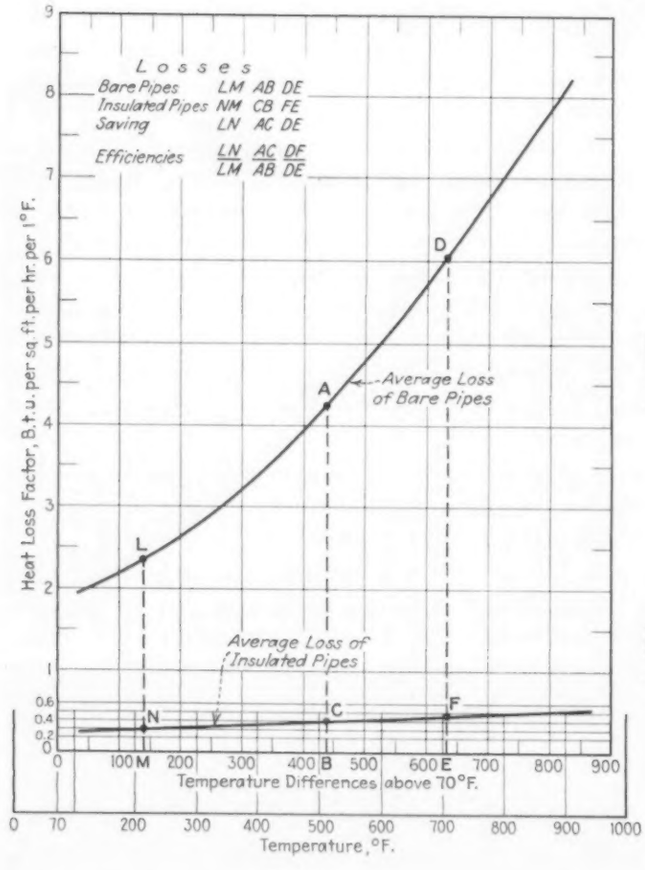
Ing. A.M.M., New York

o o o


London Data
(4 in. and 9 in.)
1 in. and 10 in. Std. Pipe
(Pittsburgh)
Heat Loss Factor, B.t.u. per sq. ft. per hr. per 1°F.
Temperature Differences above 70°F.
Temperature, °F.

ABOVE

FIG. 1—Comparison of English and American heat loss coefficients (bare pipes).


Losses
Bare Pipes LM AB DE
Insulated Pipes NM CB FE
Saving LN AC DE
Efficiencies LN/LM AC/AB DF/DE
Average Loss of Bare Pipes
Average Loss of Insulated Pipes
Heat Loss Factor, B.t.u. per sq. ft. per hr. per 1°F.
Temperature Differences above 70°F.
Temperature, °F.

AT LEFT

FIG. 2—Average efficiencies and savings of good insulation.

THE heat losses of bare surfaces are very large and increase considerably with the temperature difference between the hot body and the surrounding objects. This fact was recognized early in the art of heat applications, but very little attention was given to these losses until about 1900, mainly because accurate data regarding the waste were not available at that time and because the temperatures used in most industrial work were moderate.

The magnitude of the losses of heat through bare pipes and steel surfaces was fully appreciated by the turn of the century. The use of constantly rising high temperatures demanded a corrective. Heat insulation became a practical necessity. Many insulating materials were developed from 1900 to 1930 to save the major part of the heat lost by the bare

*Copyright, 1935, by J. F. Shadgen.

Insulation — A New Field of Application for Sheet Steel*

Fundamental Principles and Technical Background of "Massless" Type Insulators with Large Air Spaces and Metallic Surfaces of Low Emissivity

pipes and apparatus heated for industrial purposes.

The development of accurate measuring instruments gives today positive information about these heat losses over the full range. In Fig. 1 heat losses are plotted as ordinates against temperatures over normal atmospheric conditions, which are assumed to be 70 deg. F. The curves show the latest English (1926) and American (1920-1924) test data and permit a quick comparison of the laboratory results. For all practical purposes the coefficients originating from these two sources are the same over the whole temperature range. As the experiments in London were made with pipes 20 ft. in length in still air, these factors represent minimum values because under factory conditions air circulation and drafts are inevitable and will increase the losses shown on the chart. The money values of these coefficients can be visualized by assuming fuel at $4 per ton at a heat value of 12,000 B.t.u. per lb., a use-factor of 50 per cent of the 8750 hr. of the year and a heat generating efficiency of 80 per cent.

Under these conditions:

At 800 deg. F. 1 sq. ft. loses about 2500 lb. of coal equivalent to $5.00 per year.
At 500 deg. F. 1 sq. ft. loses about 760 lb of coal equivalent to $1.50 per year.
At 250 deg. F. 1 sq. ft. loses about 300 lb. of coal equivalent to $0.60 per year.

Effective insulation avoids 85 per cent to 97 per cent of these heat and money wastes. As shown graphically in Fig. 2, good modern insulating material reduces the heat loss coefficient from 7.5 B.t.u., hour, square feet, 1 deg. F., to 0.5 or 0.6 at high temperatures, and from 2 B.t.u., hour, square feet, 1 deg. F., to 0.2-0.25 at low temperatures. The overall cost of applied insulation varies with thickness, quality and many other factors. To be economical it must not exceed $2.50 per sq. ft. for high temperature applications and average 50c. to 75c. less per sq. ft. for low temperature work. These general practical limits are, of course, subject to many shadings and adaptations. Under these conditions all insulation work can be amortized easily and rapidly and in most industrial work it is justified as a well paying, obvious, plant necessity.

Diffusion Insulators

An analysis of the above heat losses brings out the well known fact that the causes of all heat transfer are subdivided into two classifications:

(a) Radiation.
(b) Diffusion. The latter has two components:
1. Convection.
2. Conduction.

Each of these phenomena has been studied carefully by all national research laboratories of the leading industrial nations and all school books on physics teach the fundamental principles relating to all of them.

The vast majority of the insulating

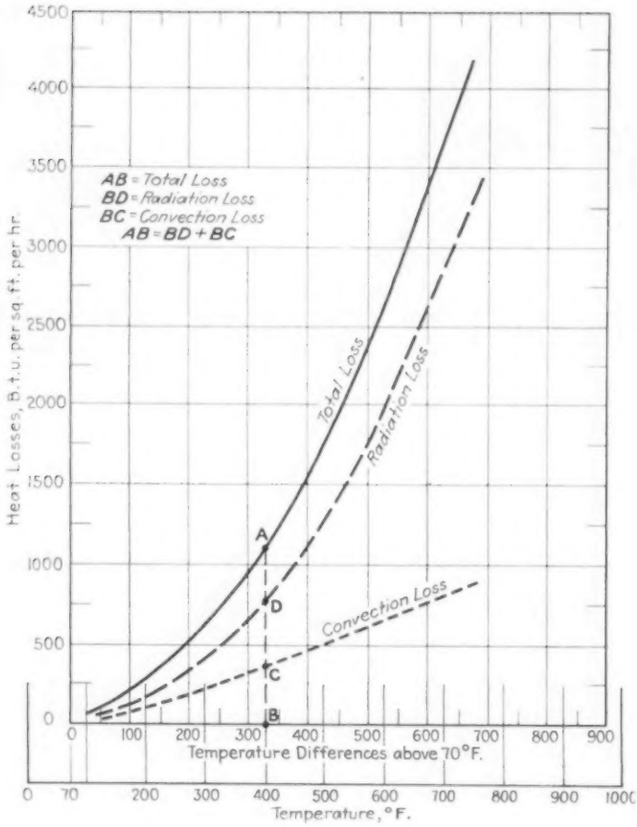


FIG. 3—Importance of radiation effect of total heat loss.

materials and designs developed from 1900 until lately are based on the diffusion characteristics. Low conductivity of the material and its porosity, meaning a multitude of tiny air spaces imprisoned in walls made of poor heat conductors, form the preferred formula of the manufacturers. The insulating value of "still air" had been long recognized as the most helpful ingredient.

The success of cork as an insulator is largely due to the perfection with which nature makes tiny air cells in the bark of oak trees. The diatomaceous rocks offer great resistance to heat transfer mainly on account of the air entrapped in the shells of the tiny dead animals. Magnesia used as an insulant is a factory-made product of definite and controlled porosity.

The ratio of air to material, on a volume basis, varies from one-third to two-thirds and seldom reaches the higher figure. The outstanding feature is the MASS of the materials. Usually in powder or in granular form, these substances are either of vegetable origin or of mineral nature, raw refined or artifically manufactured or synthetically compounded.

The temperature range determines the choice of the material: cork or wood; plant fibers or hairs for refrigeration work; glass wool, vitrified rock, spun pods, magnesia, asbestos, kieselguhr, etc., for heat applications. Their names vary with the fancies of their makers but in principle they are alike. They register on the scales from 4 to 20 lb. per cu. ft. and the most successful of them vary between 12 to 16 lb. per cu. ft., compared to 62.4 lb. per cu. ft. for water.

The application of these types of insulation to the surfaces is done by molding the contours of the surfaces to be protected. The job requires special labor and manual skill to assure effectiveness. The powder materials, the water and the plastic batters make dust and dirt quite inevitable. To finish these installations canvas covers, metal sheeting or plaster are necessary.

Heat Loss Restudied in Relation to Radiation

In the past few years the attention of the investigators has been directed to a thorough reanalysis of the whole problem of heat loss. Modern research has been focused with the help of very sentitive and very accurate optical and electrical instruments on the *radiation* phenomena. The predominating importance of this mode of propagation of heat has been brought in the foreground. All previous conceptions had to be put aside and the whole problem reappraised in accordance with the accepted law governing electro-magnetic vibrations.

The results of the latest published tests made by R. H. Heilman at the Mellon Institute of Industrial Research in Pittsburgh, published in 1931 as part of a paper entitled "Surface Heat Transmission" presented at the Rochester meeting of the American Society of Mechanical Engineers, are graphically plotted in Fig 3. The radiation effect obviously dominates the picture. At high temperature it contributes over 85 per cent of the heat loss and at low temperature never less than two-thirds.

The heat lost by radiation is expressed by the law of the well known twin physicists, Stefan and Boltzmann. Both these investigators drew attention to the absolute temperatures and proved that radiation of heat waves is proportionate to the difference of the fourth power of these temperatures.

$$Hr = 0.1723 \times 10^{-10} \times E \times (T_1^4 - T_2^4)$$

In this formula Hr is the heat radiated in B.t.u. per sq. ft. per hr.; T_1 and T_2 the absolute temperatures (ordinary degree F. plus 459 deg.); 0.1723 constant corresponding to ideal black body determined experimentally, and E is the specific emissivity value of a surface compared to black body surface. The Pittsburgh tests harmonize with those made by Griffith and Davis, in England, as published in special report No. 9, Department of Science and Industrial Research of London.

It should be remembered and borne in mind that all heat reactions are

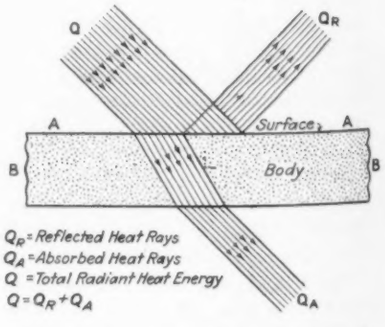


Fig. 5—Absorption and reflection of radiant heat energy at surface of body.

today considered a portion of the vibratory energy consisting of that sequence of specific waves that have a frequency between 500 billion and 350,000 billion per second—between the Hertz waves and the luminous vibrations.

Determining Emissivity

This new conception quite naturally led to a further series of experiments to determine the *E* values of various surfaces. The importance of accurate determinations of the emissivities is undeniable. A special instrument called a Radiometer has been developed for that purpose using lamp black (films of 0.002-0.003 in. thick) as a basis for comparison. The emissivity of lamp black was found to be 0.945, while the ideal black body is 1.000, and this value remained practically constant over a range of temperatures varying from 100 to 700 deg. F.

Tests to be accurate and valuable have to be made with invisible (dark) heat rays as well as with visible (bright) light vibrations. These two types differ by their frequencies and wave lengths as most of us know today, owing to the practically universal familiarity with the radio and its theoretical background.

Continental investigators, in particular E. Schmidt, made careful tests on the same subject, as published in "Health Engineer" (1927), mostly with short wave lengths. It is necessary to further investigate the emissivity values of many surfaces and take due cognizance of the peculiarities of each wave length in the zone of wave frequencies comprising the infra-red spectrum, giving special attention to wave lengths from 0.8 to 10 microns.

It is well known, for instance, that ordinary glass is transparent to white light (combination of a series of luminous colored rays) but it is also known that glass acts like a filter to ultra violet rays. Undoubtedly similar selective reactions occur in the zone of radiant heat vibrations, but we have not as yet investigated carefully the behavior of these waves under practical conditions. The suggestions that are to follow are made realizing the fragmentary nature of our knowledge of detail data; but the general deductions will not be affected by minor variants.

Fig. 4 shows a tabulation in which an attempt is made to classify these surface characteristics into five zones differentiated by definite emissivity values. Zone No. 1 is characterized by *E* factors greater than 90 per cent; zone No. 2 comprises those surfaces having an emissivity of around 75 per cent; the third group, about 50 per cent; the fourth, around 20 to 25 per cent, and the fifth group, less than 10 per cent.

TABLE OF EMISSIVITY VALUES

ZONE	RANGE	SURFACES OF MATERIALS	E* EMISSIVITY VALUES
STANDARD	E = 100%	ABSOLUTE BLACK BODY	1.00
I	E ≳ 90%	LAMP BLACK	0.945
		PAPER	0.94 — 0.96
		ASBESTOS PAPER	0.92 — 0.94
		BRICK, PORCELAIN, PLASTER	0.91 — 0.95
		WOOD, PAINT, LACQUER (FLAT)	0.98 — 0.98
		ROUGH STEEL PLATE	0.94 — 0.96
II	E ≈ 75%	LACQUER (GLOSSY) BLACK OR WHITE	0.80
		CAST STEEL AND CAST IRON (ROUGH)	0.79 — 0.85
III	E ≈ 50%	LEAD; BRASS (Cu AND Zn)	0.60 — 0.64
		OXIDIZED COPPER	0.55 — 0.58
		CAST IRON (TURNED)	0.45 — 0.49
		NICKEL, MONEL	0.40 — 0.42
IV	E ≈ 25%	ALUMINUM PAINT	0.30 — 0.32
		ALUMINUM CAST	0.20 — 0.24
		ZINC SHEETS ORDINARY DULL	0.19 — 0.20
		STEEL SHEETS BLACK	0.15 — 0.18
		LEAD COATED STEEL SHEETS BLACK	0.12 — 0.16
V	E ≲ 10%	POLISHED BRIGHT ALUMINUM SHEETS	0.05 — 0.07
		" " COPPER "	0.04 — 0.06
		" " SILVER "	0.02 — 0.03
		" " ZINC "	0.06 — 0.09
		" " TIN "	0.05 — 0.12
		" " STEEL "	0.10 — 0.14
		" " STAINLESS STEEL SHEETS	0.07 — 0.08

**E is specific to each radiant vibration*

Compiled from many sources. Data not complete, often unreliable

Fig. 4—Tabulation in which an attempt is made to classify surface characteristics into five zones differentiated by definite emissivity values.

How Heat Transfer Is Effected

In order to clarify this novel approach to heat transfer a simple explanation may be quite apropos. Let us assume a certain quantity of vibratory energy that travels toward a surface *A* of a body *B*. (See Fig. 5.) As soon as the energy strikes the surface two things will happen simultaneously: part of the energy is reflected by the surface *A*, while the remaining part will penetrate into the body *B*, raises its temperature and continues to propagate within that new medium at a rate determined by its specific resistance. The ratio between these two quantities is entirely governed by the emissivity value of the surface *A*. If owing to its finish, color, nature, texture, etc., the surface restricts the flow of energy its emissivity is low; if it offers free passage its emissivity is high. In the first case it acts like a mirror, in the second like a sponge; in the first case it will interfere with the radiant flow of heat and act as an insulator, in the second case it will offer but little resistance and let the radiant heat enter its very body.

Surface Is Key to Insulation

The main point is that the SURFACE is the deciding factor, not the nature of the material. In other words, good conductors of heat, such as steel, zinc, aluminum and copper, can become effective insulators of heat because their surfaces reflect the radiant part of the heat loss which constitutes from 65 to 85 per cent of the total loss. This conclusion is quite

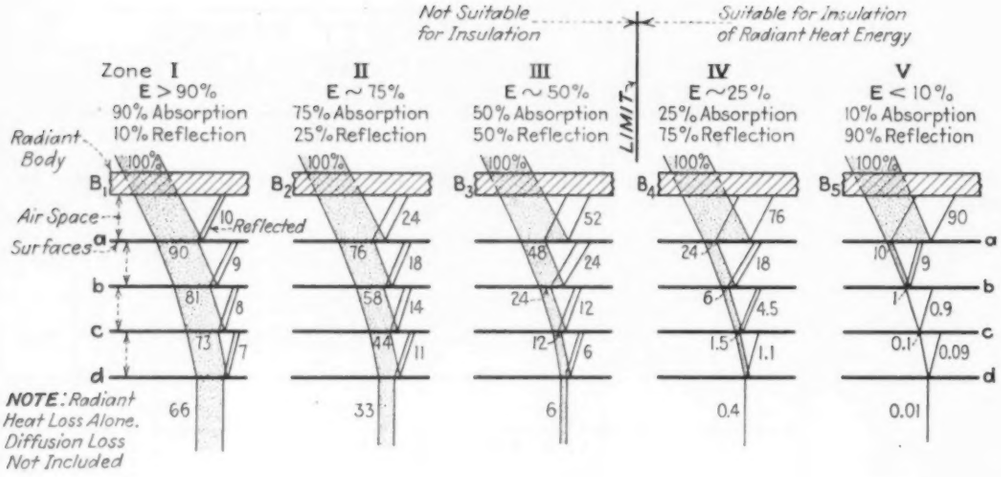


FIG. 6—Comparison of reflection effects of five designs using surfaces with different emissivity values.

obvious, although it seems like a paradox.

Hence, metal-type heat insulators have a very solid scientific background, provided the above fundamental facts are correctly applied in practical designs. Let us go a step further.

Thin Metal Sheets as Insulators

In Fig. 6, five bodies, B_1, B_2, B_3, B_4, and B_5, which radiate out the same amounts of heat energy, are put side by side. Parallel to these bodies are placed surfaces of relatively thin materials in layers, *a*, *b*, *c*, *d*, separated by spaces of air or gases (four conductors), represented by *Ba*, *ab*, *bc* and *cd*. The five sketches vary from each other only by the nature of surfaces of *a*, *b*, *c* and *d*. In sketch I their *E* is 90 per cent, in sketch II *E* is 75 per cent, in sketch III it is 50 per cent. The heat losses are getting smaller and smaller but are yet appreciable, as a quick glance at the diagram shows. Sketch IV employs surfaces having low emissivities, averaging 25 per cent, and sketch V employs materials with emissivity values of less than 10 per cent. The drawing demonstrates that all heat losses due to radiation are eliminated under these conditions. Hence designs corresponding to sketches IV and V are good insulators for the radiant part of heat loss over the full range of temperature scale.

If, furthermore, the convection heat losses are reduced by emprisoning the air in the spaces between the layers *a*, *b*, *c* and *d* so that the insulating effect of dead or still air is added, the designs promise to have real practical value.

By using thin metal sheets or even foils the high conductivity of the metals are compensated, and losses from that source are controlled to acceptable proportions.

The diagram of Fig. 7 visualizes how such designs of thin metal sheets, with low emissivity surfaces, combined with dead air spaces, reduce all three component heat losses effectively and produce an insulator that compares in effectiveness with the best mass type design. This new type can be called "*Massless*" on account of the predominance of some 95-99 per cent of air spaces within its volume. A number of additional advantages are inherent, which the practical users of insulation will undoubtedly appreciate, such as cleanliness and permanency.

The metals that promise to have a real future in this new type of insulation are aluminum, zinc, steel and copper.

Aluminum As an Insulator

Aluminum, in spite of handicap due to its high unit price of 20 to 22c. per lb. in ingot form, has found its place. The high base price caused the designers to resort to very thin sheets of the order of 0.0003 in. Aluminum foils of that thickness cover over 200 sq. ft. per pound. These foils are obviously delicate to handle, as they tear easily; they are marketed in rolls up to 16 in. wide. Several patented design features are offered at present. Aluminum on account of its light weight is well adapted to many

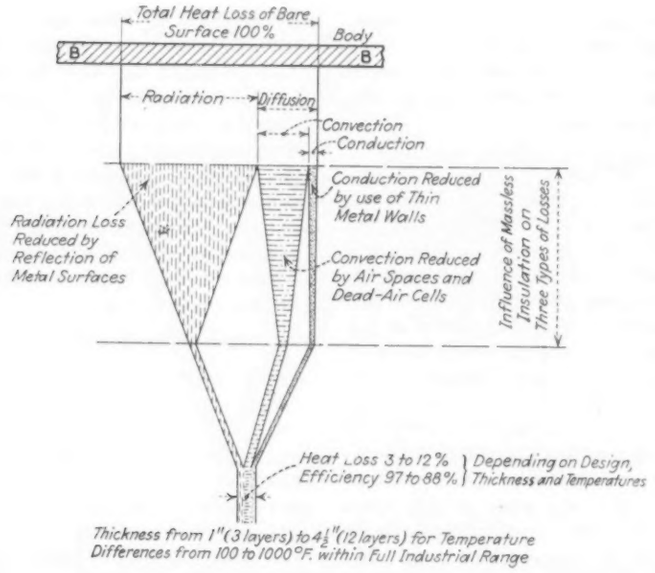

Total Heat Loss of Bare Surface 100%
Body
Radiation
Diffusion
Convection
Conduction
Conduction Reduced by use of Thin Metal Walls
Radiation Loss Reduced by Reflection of Metal Surfaces
Convection Reduced by Air Spaces and Dead-Air Cells
Influence of Massless Insulation on Three Types of Losses
Heat Loss 3 to 12%
Efficiency 97 to 88%
Depending on Design, Thickness and Temperatures
Thickness from 1" (3 layers) to 4½" (12 layers) for Temperature Differences from 100 to 1000°F. within Full Industrial Range

Fig. 7—Graphic explanation of effectiveness of massless type insulators.

applications where this is a deciding factor.

The flimsiness of the very thin aluminum foil has led several manufacturers to develop "composite" products, such as strong craft paper with aluminum foil glued on one or both sides. That increases the cost but for some purposes offers a very practical solution. House insulation with this type of material has found considerable favor during the past few years.

The emissivity of aluminum varies from 3 per cent up to 10 to 15 per cent and varies with the wave lengths considered; its *E* for luminous rays fluctuates between 4 to 7 per cent as its mirror-like appearance tells even the casual observer.

The Use of Zinc Foil

Zinc has been tried out experimentally and found very suitable. The difficulties in rolling zinc foil have been overcome by at least one manufacturer. Thicknesses down to 0.0005 in. are on the market (50 to 55 sq. ft. per lb.). The low ingot price of zinc of some 3c. to 5c. per lb. compensates the high density compared to aluminum (2.65 to 1) and leaves a price differential in favor of zinc foil on a square foot basis.

Wave lengths of 2 to 12 microns are readily reflected by zinc. The emissivity values of zinc vary between 4 to 10 per cent.

Both these metals are whitish and can be rolled to bright finish. That was considered essential until lately. Both are practically permanent under normal atmospheric conditions; the oxides of both these metals are such that corrosion is arrested and further attack of the metal stopped.

On account of the foil type nature of these metals, spacers are necessary to support the outside cover which reduces considerably the extreme light weight feature of their designs. As a rigid outside cover is a necessary part of the design, the weight per sq. ft. 1 in. thick is never less than ½ to ¾ lb., including spacers and sheeting. This, of course, does not apply to those applications where outside covers are part of the appar-

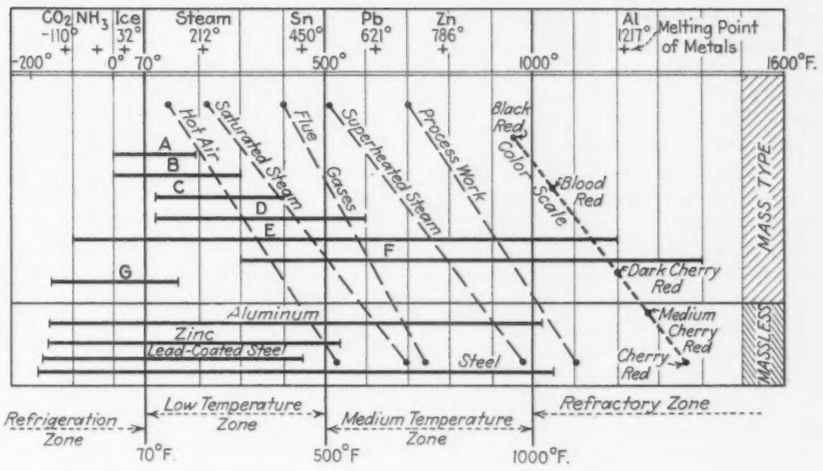


Fig. 8—Temperature range of various insulating materials.

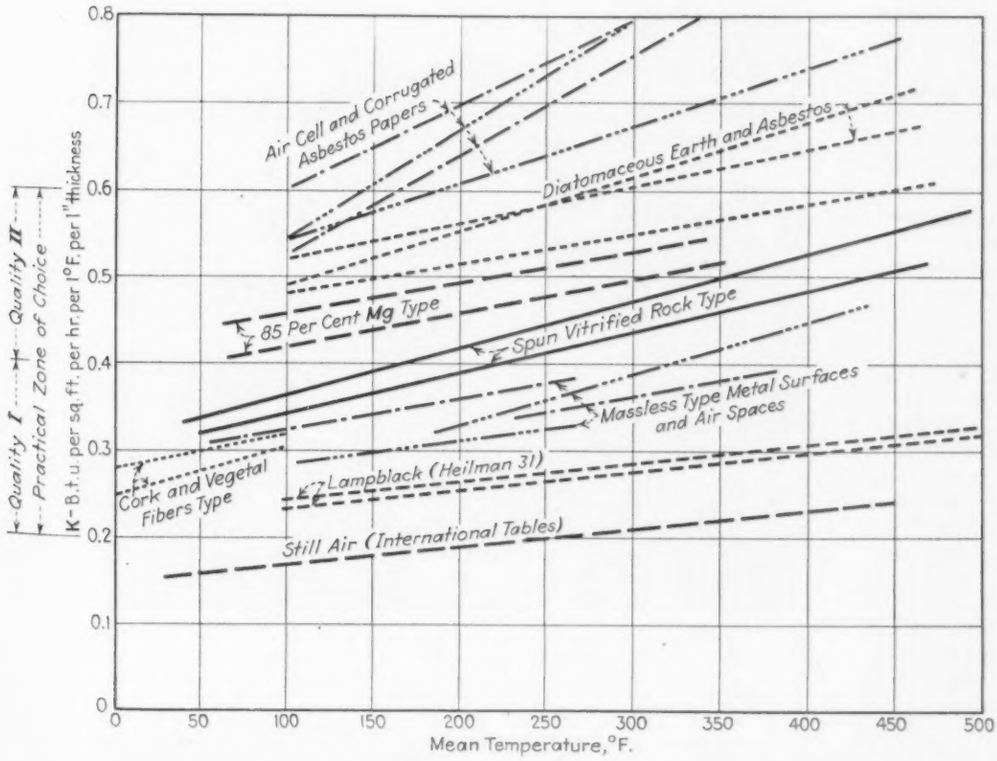


FIG. 9—Thermal conductivities of various insulating materials.

atus such as in refrigerator boxes for household purposes for instance.

Iron and steel has a definite place in the picture of massless type insulation. The low price of the raw material, and its universal availability are points in favor, making possible the use of standard iron sheets in gages around 38 and 42. United States gage No. 38, with a thickness of 0.0061 in., weighs 0.25 lb. per sq. ft., and United States gage No. 42, with a thickness of 0.005 in., averages 0.20 lb. per sq. ft. These sheets are rolled in widths varying from 24 in. to 48 in., which reduces the number of joints 50 per cent or even 75 per cent when compared with aluminum or zinc.

Iron and Steel Sheets as Massless Insulators

As the key is the nature of the surface, the quality and finish of the steel sheets are of paramount importance to assure low emissivity values specific to the black heat waves that radiate in the temperature range from plus 1200 deg. down to minus 50 deg. F. Investigations have definitely established that emissivities below 20 per cent are specific to black steel sheet surfaces, and that rolled commercial sheets with *E* values of less than 10 per cent are on the market at present. Indications are that *E* will vary between 5 and 15 per cent over the full range, which definitely opens this new field of application to this basic metal.

In Fig. 8 the temperature range of the most popular industrial applications are compared graphically and the limits of applicability of the major types of insulating materials are shown in such a way as to make for quick, easy and accurate decision. The massless type of insulators have been segregated from the conventional ones and a number of practically important key points of the temperature scale have been added to increase the usefulness of the diagrams.

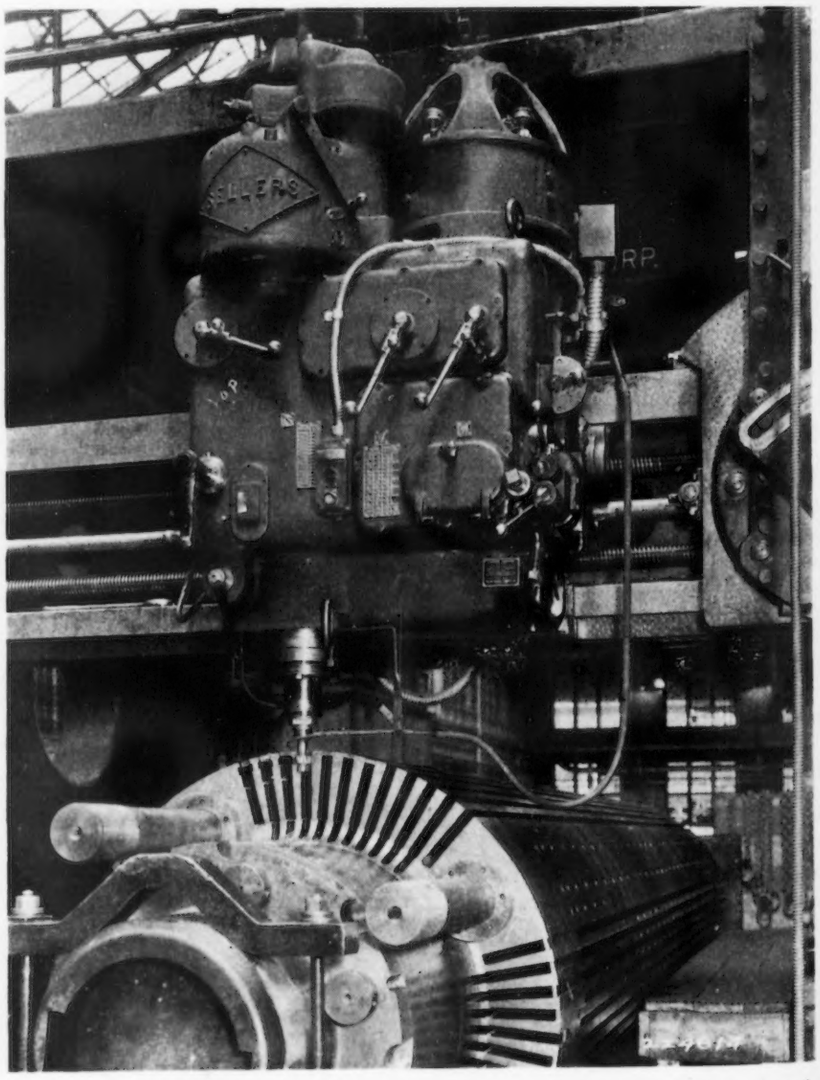
No study of this nature is complete without giving data covering the overall conductivity factor of the various insulators; this is an abstract figure, something of a yard-stick. While not actually determined by experience, its value is deducted from test results secured under laboratory conditions.

The heat conductivity factor "*K*" expressed in B.t.u., per square foot, per hour, per 1 deg. F. temperature difference, per 1 in. thickness at a specific mean temperature level is like a common denominator that makes comparisons easy and practical. It is customary to submit to the laboratories test pieces 18 in. to 24 in. square, 2½ to 4 in. thick. Test conditions cancel out all errors from outside sources, so that results are strictly on an even keel.

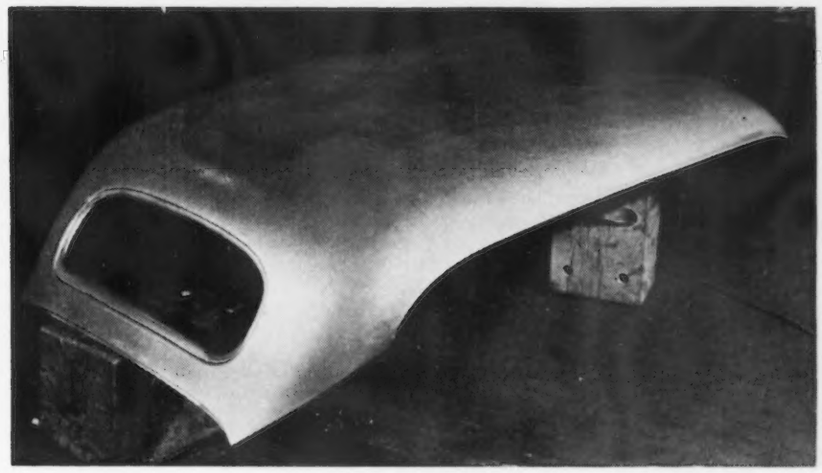
Fig. No. 9 is a graphical compilation of a number of heat conductivity factors of mass type and massless type insulators and materials. The underlying figures were carefully chosen in order to be truly comparative. To furnish a sound basis for fair appraisal of the various designs top and bottom averages have been drawn to form zones characteristic to the various types of insulants. The massless type insulators show up well; their conductivity factors are low enough to give them excellent competitive position at the present stage of development from that angle.

The characteristics of still air are also plotted in the diagram indicating the optimum value of the ideal insulation medium. Dead carbonic acid gas offers the only means to lower the figures of still air which leaves open an interesting research door, particularly promising to the refrigeration applications.

In this exposition the technical development of an important branch of engineering has been shown from the empiric beginnings of the early pioneers in heat and cold insulation to the scientific deductions of the modern investigators equipped with the sharp tools and accurate instruments of modern science and industry. A surprising new field of application for steel has been uncovered that promises to enlarge the usefulness of this basic metal. The commonplace truth that the horizons of industry are broadened by research has again been convincingly proved.



MILLING wedge slots in a rotor that will form part of the world's most powerful single shaft generating set which is being built at the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. The machine is rated at 183,333 kva., 13,800 volts, three phase, 60 cycle 90 per cent power factor, and is driven by an 1800-r.p.m. turbine. The rotor is 26 ft. long and is made up of 60-in. diameter disks and end-forgings held together by four 6-in. bolts and a 13-in. nickel molybdenum steel center bolt that weighs 6 tons. It weighs 250,000 lb.



THE Fisher turret top, a single sheet of seamless drawn steel, extends from the windshield to a point well below the rear window, where it is flanged to serve as the top of the enclosed luggage compartment opening. It is welded to the quarter panels and the steel front end assembly. These parts, with the metal flooring, form a rigid structure which architecturally is the same as the gun turrets of a battleship.

Fisher Body Installs Huge Presses To Make "Turret Top"

FOR the first time in the history of the automobile industry the protection of solid steel overhead is being offered the American motorist. The all-steel top, a development of the Fisher Body Division of General Motors Corpn., is being used by Pontiac and Oldsmobile for their 1935 bodies. It consists of a single sheet of seamless drawn steel extending from the windshield to a point well below the rear window and is further strengthened by a series of heavy U-shaped metal bows underneath.

The "turret top," as it is popularly called because the component parts of the new Fisher bodies form a structure embodying the architectural principles employed in the construction of the gun turret of a battleship, serves a triple purpose. It first gives unprecedented strength and safety to the roof itself. It adds strength, too, to the rest of the body, in that it supports and reinforces the entire body unit. It permits of a beauty of roof line unknown on the conventional car by allowing a graceful sweep from one end of the body to the other.

Effectively removing any rumbling noise and shutting out both heat and cold, a layer of quarter-inch insulating material is secured to the underside of the steel roof and other parts of the metal sheathing.

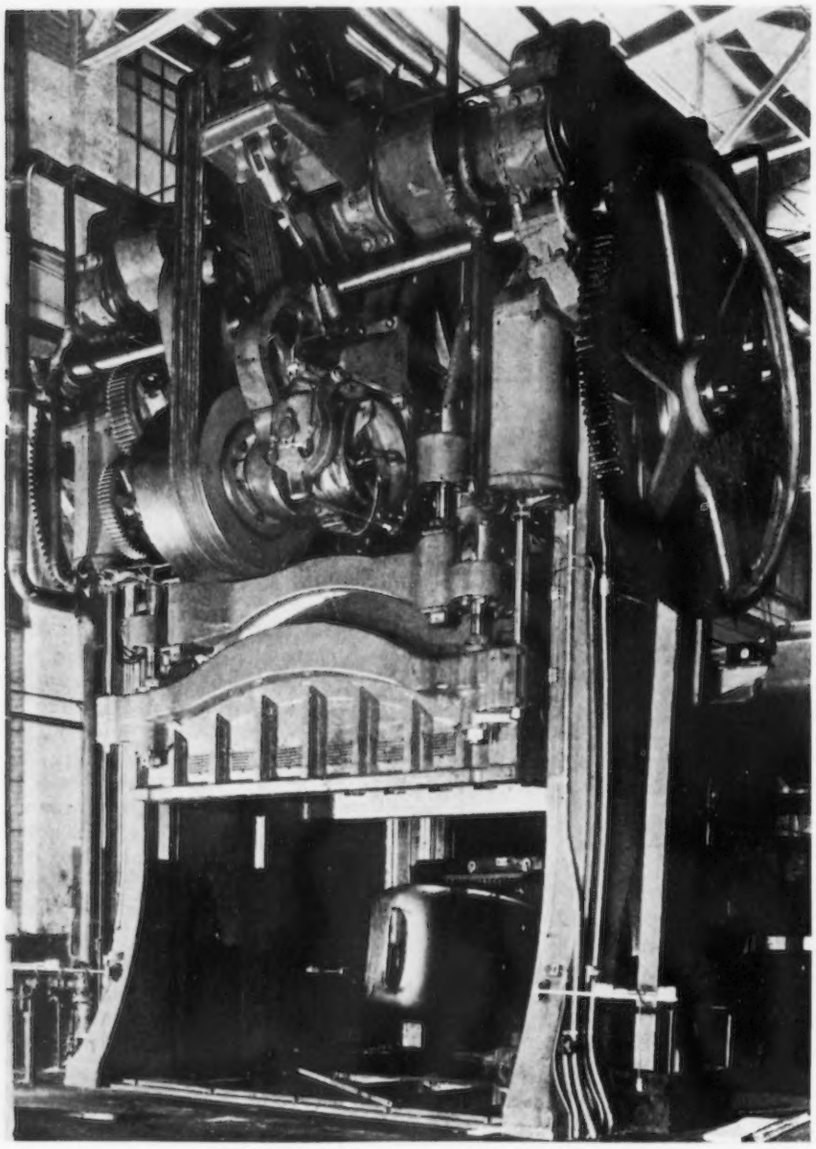
Each Roof Passes Through Four Presses

Manufacture of the "turret top" from one piece of sheet steel presented a major production problem, as never before had sheets been formed in such great dimensions. Accordingly, Fisher Body had built and installed in its various plants 18 giant presses to be used for drawing and forming the newly designed tops. Every solid steel roof that is produced must pass through four of them. These presses exceed in size any heretofore built. They vary, of course, in detail of design. In this article two types of presses will be described.

One is the triple-action toggle type. At floor elevation it measures 16 ft. 8 in. x 22 ft., weighs approximately 500 tons, towers 27 ft. above the floor and extends 12½ ft. below the floor into a concrete pit. It is capable of delivering a working pressure close to 1000 tons. Its bed size is 100 x 180 in.

and it will take sheet metal blanks of that size.

This unit will turn out the most intricate stampings accurate to dimensions and with a consistent mirror-like finish, thus eliminating many grinding and polishing operations which previously had to be performed when double-action presses were employed. At a single stroke it makes stampings formerly requiring two operations, thus reducing die and die maintenance costs.



AT a single stroke this triple-action toggle type press makes stampings formerly requiring two operations, thus reducing die and die maintenance costs. It towers 27 ft. above the floor and will take sheet metal blanks 100 x 180 in.

The "slow draw" mechanism is one of the refinements incorporated in these presses. The actual stroke of the outer blank holder slide is 26 in., that of the inner blank holder slide 16 in. and that of the lower slide 10 in. Obviously a stroke of such length, if taken at a uniform rate of six strokes per min., would subject the metal to a drawing speed too great for uniform flow of the metal. To avoid restriction of the output of the press by reducing the operating speed, the plunger slide speed is automatically decreased over a part of the stroke. For the first 150 deg. of the downward stroke, which includes the drawing period, the plunger slide travels at a rate of only 3½ strokes per min. During the remaining 210 deg. of the stroke it is speeded up to a rate of 10 strokes per min. Thus the impact speed of the punch striking the blank is considerably less than that in the shorter stroke double-action presses of conventional design operating at the same number of strokes per minute.

Presses Are Precision Preloaded

An outstanding characteristic of the new presses is that they are precision preloaded units. Tie rods constitute the element in the modern press best adapted to serve as control members in absorbing critical overload strains. The tie rod is a simple tension member, offering the widest latitude in proportioning. It can be made of any of a number of materials. In the conventional press initial rod stresses cannot be equalized or accurately controlled, although both equalization and control are attained by precision preloading.

In the erection of a precision preloaded press, tie rod nuts are tightened down by hand in the usual way. The slide is lowered to bottom position and hydraulic jacks placed between it and the bolster directly under the cranks. Pressure on the jacks then is increased until the rods are stretched a definite amount, but not more than one-third their elastic limit. The uprights, being fastened only to the arch, lift away from the bed as the rods are stretched. Into the space thus formed are inserted accurately ground shims which hold the uprights in an elevated position and maintain the required tension in the rods. With the shims in position, the jacks are removed and the press is ready for use. The frame thus is a solid piece and is rigid, except under loads greater than nominal press capacity.

The new presses, encountering an overload, are in no danger from excessive stresses developed in shafts, arch or bed, none of which will fail under fatigue. Frequently recurring overloads merely result in stretching the tie rods rather than in deflection of other costly elements.

Electric Clutches Insure Safety

Electrically operated clutches on the large presses insure the safety of operators. It is customary to provide the control stations on such presses for four operators, two in front and two at the rear. Each station has two start push buttons and one stop push button. To start the machine each operator must press both start buttons at his control station, both of his hands thus being safely occupied. If any one of the eight start buttons is released after the press goes into action and before it completes its cycle, the current is

broken, the clutch released and the brake functions immediately to stop the slide. To complete the stroke, both start buttons at each control station must be held down. Whenever the operating circuit is opened purposely by releasing a start button or pressing a stop button, or accidentally by a current failure, the clutch is automatically released and the brake set.

Each press is lubricated by a dual system. A measured volume of high pressure grease is supplied to 160 lubricating points simultaneously by the action of a single manually operated pump. Fifteen of these points on the automatic adjusting mechanism for the lower slide constitute a separate or auxiliary circuit which may or may not be cut in with the regular lubricant supply for other press elements.

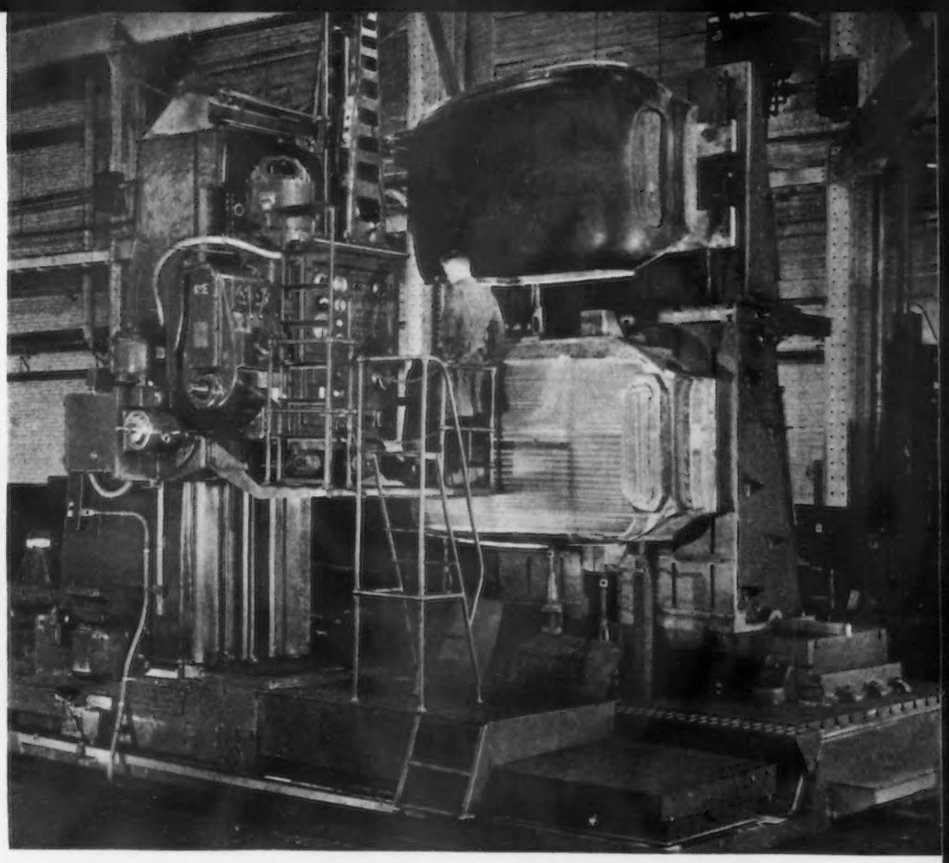
Supplementing the triple action presses are 4-point single action presses of the adjustable bed type. Like the toggle presses, these machines are the largest of their type in the world. The bolster plates are 90 x 180 x 10 in. and the slide face 84 x 175½ in. With the slide stroke (24 in.) down, the maximum distance between bed and slide is 82 in. With 62 in. deducted for the amount of bed adjustment, the minimum between bed and slide with the stroke down is 20 in.

Each press is equipped with a pneumatic drawing attachment consisting of three 32-in. diameter cushions. With 80-lb. air pressure, these cushions develop a blank holding pressure of 200 tons. The pressure pin plates are 62 x 171 in. A 40-hp. motor drives the unit at 10 strokes per min. A second motor of the same horsepower is used to elevate the bed. Both motors are high torque punch press type units. Electric push button clutch control is similar to that on the triple action presses.

Efficient Handling of Large Stampings Is Main Design Feature

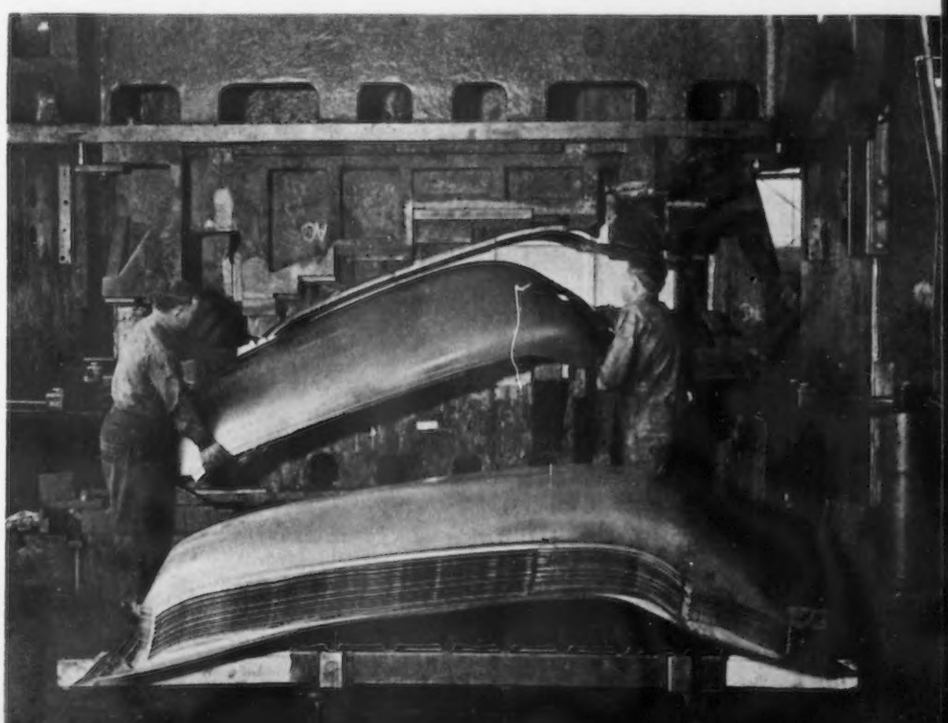
The design principle of these presses has as its main feature the efficient handling of extra large stampings. From the standpoint of design, it is a simple matter to lengthen a conventional double-crank press, but when the width of the slide is increased, operating difficulties are inevitable unless a symmetrical load distribution is maintained. Because many large body stampings are unsymmetrical, the center of pressure may occur at any point from the front to the rear edge of the slide. When such stampings are produced in the conventional double-crank press, tilting of the slide occurs. The clearance in the gibs essential to a proper running fit is sufficient to cause an amount of slide-tilt objectionable in the operation of dies with cutting edges. Under this condition, it is obvious that wear in the gibs and slideways will accelerate slide-tilt and increase rapidly the maintenance cost of the dies as well as of the press.

Presses with twin shafts and four connections were developed to remedy this condition. Theoretically in such a press the pressure is equally distributed to the four corners of the slide; hence the name "four-point"



DIES employed in production of the new turret top are cut on this Keller profiling machine. A guide moving over the surface of the wooden pattern governs the action of the cutting tool below. o o o

THE turret top as it comes out of the huge press which has stamped it from one piece of sheet steel. o o o



press. At first glance, this seems a simple solution of the problem, but experience has shown that merely increasing the number of slide connections is not enough. In some presses design limitations make it necessary to keep the outer edges of the slide some distance beyond a vertical plane through the two front or two rear connections. When the load concentration or center of pressure falls within this marginal space, slide tilt is inevitable in spite of four-point construction. The connections and wrist pins on the side where this load concentration occurs will be thrown into compression, while those on the opposite side will act in tension. Bearing clearances on the near side will be taken up in one direction and those on the far side in the opposite direction. In other words, the slide will tend to rotate about a fulcrum represented by a line between the adjacent connections. No slide can be held parallel to its bed under such conditions and the extra cost of four-point construction cannot be justified where such a possibility exists.

Four-Point Design Incorporated in Presses

Recognizing this situation, Fisher Body engineers sought a design solution which would eliminate this hazard. The result is the four-point design incorporated in the two single action presses. With these units no load concentration can fall beyond a plane through the slide connections because these points are always outside the front and rear edges of the slide face. A center of pressure on the edge of the slide could not reverse the reactions in the connection and shaft bearings on the opposite side. The lines of pressure always will pass through the top half of the bearings on both sides and therefore the slide never can tilt. This basic mechanical principle is simply that of putting the supporting columns of a beam at the ends of the beam instead of elsewhere.

The slide is actuated by a single central crankshaft through two oscillating rock shafts located above and beyond the edges of the slide. The only gearing within the uprights of the press is a single pinion on the power drive and a single gear on the central crankshaft. Heavy links transmit the movement from crankshaft to rock shafts. The usual connections are used between rock shafts and the slide.

The huge presses installed by Fisher Body can be used to produce not only the "turret top," but also other large body panels—quarter panels, door panels, the steel flooring and the front end assembly (that portion of the body from the dash back to the instrument panel and including the corner posts). The front assembly passes through 20 different machines.

Various metal parts of the body travel to the assembly department, where the front assembly is completed. This, with the solid steel roof, quarter panels and steel flooring, is put in a set-up buck in which the parts are welded into a single unit. At the end of the line the body is placed in a welding finishing buck, where the reinforcing for the wheel housings and the facings of the doors, front pillars and windshield opening are solidly joined together. Here also other parts of the interior framework are welded to the steel shell. From this point on a number of assembly, cleaning and finishing operations are performed and the complete body is rigidly inspected.

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WORKMEN preparing the cutting edges of a 52-ton tool steel trim die which shears off the excess metal in the manufacture of the turret top.

o o o

A new book entitled Aluminum and Its Alloys (in French) is now being distributed, without cost, by L'Aluminium Francais, 23 Bis, Rue de Balzac, Paris, 8e. To secure this 120-page volume write to the association. The properties of aluminum and its alloys are discussed as well as different methods of working and finishing the alloys. A considerable portion of the book is devoted to various applications of the alloys, such as in automobiles, railroad equipment, ship and airplane construction, and various uses in the electrical, chemical and building decoration fields.

Portable Grinder.—Onsrud Machine Works, Inc., 3900 Palmer Street, Chicago. Description, illustrations and applications of air turbine motor operated equipment, weighing less than 2 lb., and having 50,000 r.p.m.

Vacuum System Keeps This Foundry Clean

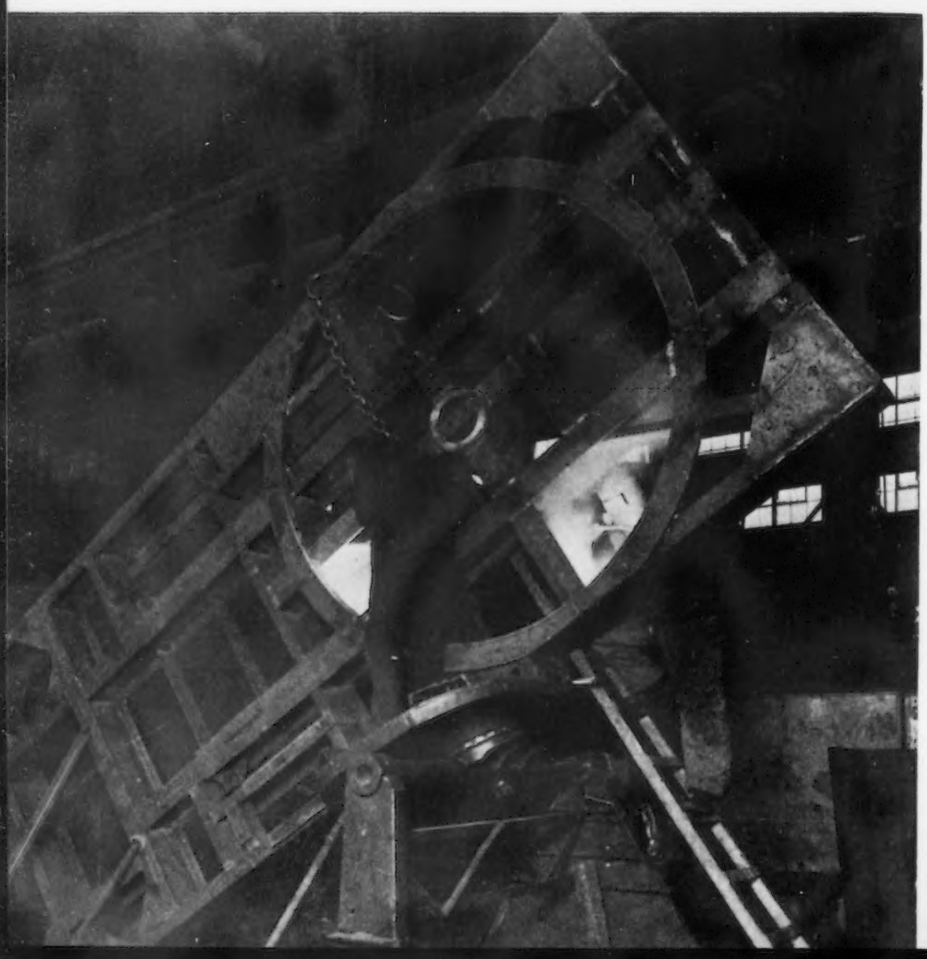
SLOAN VALVE CO., Chicago, manufacturers of plumbers' supplies, has recently completed installation of a central vacuum cleaning system which is used in all departments of its foundry. All dirt and dust picked up by the cleaning tools are delivered to separators which stand outside the main building and under a lean-to which also protects the motor-driven blowers. There are two separators, one being the primary unit, which is of the centrifugal type, and the other being a secondary unit, which is of the tubular bag type. Fully 95 per cent of the dust is removed in the primary separator. The cleaned air is exhausted to the atmosphere. The separator tanks are of the hopper type with discharge gates at the bottom so they are easily cleaned by dumping direct into containers spotted under the tanks. This equipment was furnished by The Spencer Turbine Co., Hartford, Conn.

HARD surfaced foundry floors are easily kept clean of dirt and dust by means of a central vacuum cleaning system.

SLOAN VALVE CO., Chicago, makes extensive use of vacuum cleaning throughout its foundry. Not only are floors so cleaned but also benches, machinery and overhead work, such as pipes, beams, etc.

SPECIAL vacuum cleaning tools broaden the use of the central system. In this picture a special wall brush is being used to clean the walls in the melting department of the Sloan non-ferrous foundry.

Fixtures Facilitate Welding Large Parts



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SOME of the fixtures employed in the weldery of the Harnischfeger Corpn., Milwaukee, which makes extensive use of welding in fabricating excavator, crane and other machinery parts, are shown in the accompanying illustrations. They were developed to assure production of sound welds together with rapid and efficient depositing of weld metal, the latter by providing means for easily and quickly tilting the work into the most advantageous welding position.

Used with a suitable layout of electric hoists and other handling equipment, these fixtures reduce floor space requirements of the weldery as a whole, and make unnecessary the use of expensive overhead traveling cranes either for holding the work during welding or for frequent changing of the position of heavy pieces held by temporary blocking. Welding time wasted in waiting for crane service is eliminated; and further reduction of cost is attributed to the fact that the easy positioning of the work permits use of all the heat the job will stand. The fixtures, with hoists, etc., reduce the number of welding machines required for a given amount of welding, and facilitate production of smooth welds that improve the appearance and saleability of the welded product.

One type of fixture, or position finder built by the company is shown in Figs. 1 and 2, the work on the former being a crane end-truck and on the latter a revolving frame for a large excavator. Of table type, these fixtures are for handling one and two-side welding of irregularly shaped machinery parts. The piece to be welded is first tacked down to the top support, which may be of various

FIG. 1—Table-type fixture or position finder employed in welding a crane end-truck (upper left).

FIG. 2—Revolving frames for large excavators are properly positioned for welding by means of this fixture.

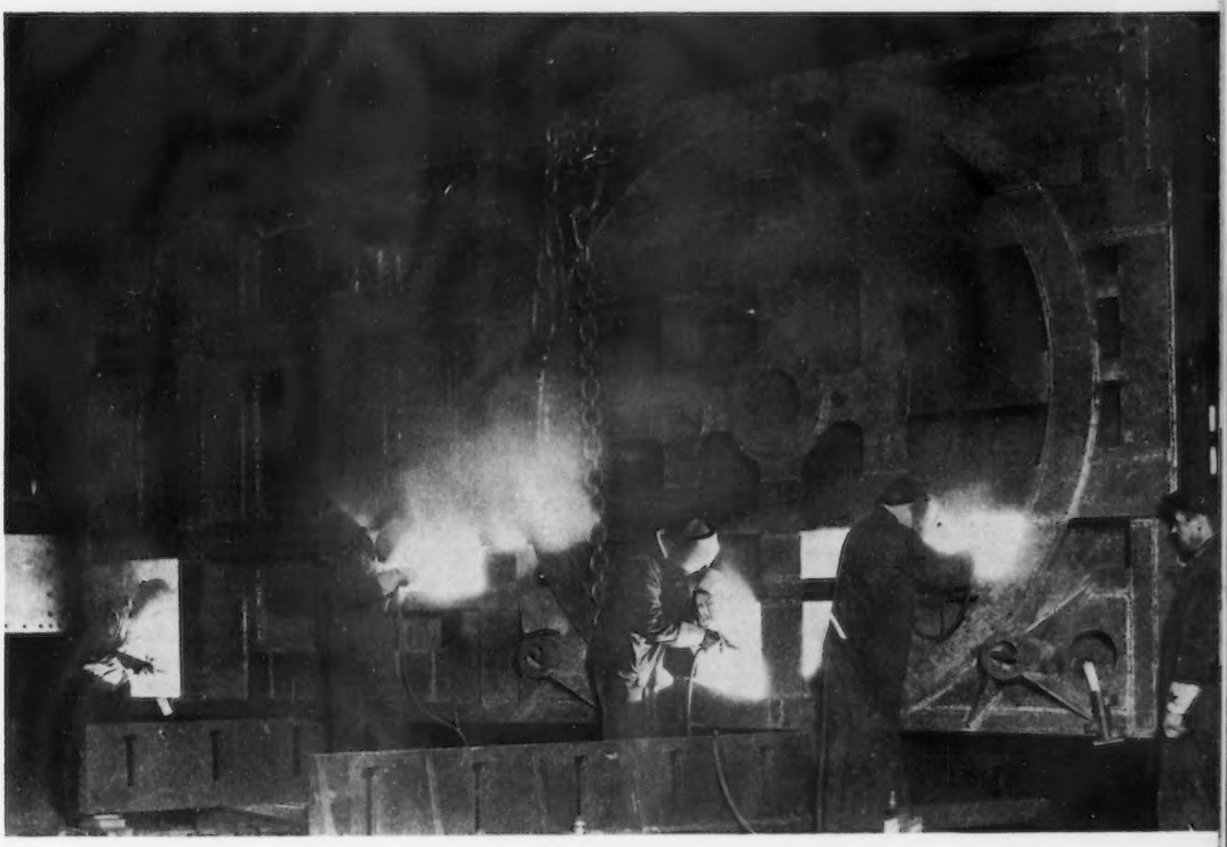

FIG. 3—(At top of page) Fixture designed for long, narrow structural parts that require welding on all four sides.

FIG. 4—This huge bed is for the most part made of rolled steel, and weighs more than 27,000 lb. Parts are first tack welded together, and then finish welded on the set-up shown. o o o

sizes and shapes, any one of which is interchangeable with another. Thus secured, the piece may be tilted in either direction through an arc of 60 deg. to permit the weld metal to be deposited in a horizontal trough, the two members to be welded being normally positioned 45 deg. with the vertical. The table assembly is mounted on trunnions and tilted either by hand or motor through a self-locking worm and worm gear unit. Two sizes of the fixture, with capacity of 4000 and 8000 lb. respectively, are employed. The top tables of both measure 3½ x 6 ft.

Fixture for Long, Narrow Parts

A second type of welding fixture, supplementing the table type described above, is shown, in Fig. 3. This is for long, narrow structural parts that require welding on all four sides. It is equipped with headstocks that can be positioned along the bed to accommodate pieces ranging from 1 to 16 ft. in length. The headstocks have screw-operated spindles, or centers, similar to those

(CONCLUDED ON PAGE 69)

Courtesy Aluminum Co. of America

METAL wall panels covered with dark enamels in glossy surface and relieved by strips of bright aluminum have been used effectively in some modern interiors.

How Attractive

30—Novelty Coatings and Synthetics

o o o

By HERBERT R. SIMONDS

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RESEARCH workers engaged on the arduous task of producing for metal parts enamel coatings which would remain smooth and flawless through the baking process found that impurities in the materials, or even in the atmosphere of the baking oven, had a habit of causing wrinkles, bubbles or cracks in the surface. Little did they think that some day these annoying impurities would be turned to profit. But that is just what has been done by the originators of some of the present-day novelty finishes. The processes of refinement which developed the smooth surface enamels have been reversed by definitely seeking to increase impurities.

Certain crystalline enamels when baked from 10 to 20 min. in a foul oven, that is, an oven in which the gases of combustion are retained, have the property of developing a uniform wrinkly texture or stipple finish as they dry. This finish has recently become popular for metal panels on scientific instruments and on such equipment as adding machines and cash registers.

Scarcely any other finish available will so readily and effectively cover defects in the base metal, and besides this important advantage some of the "krinkle" enamels, as they are called, are surprisingly durable and resistant to abrasion.

Another type of novelty finish has been developed by introducing into the enamel or lacquer a substance which causes shrinkage during drying. In this case, instead of wrinkling, the finish actually cracks and pulls apart much as a mud flat does under the action of the sun. This is known as a crackle finish. A still further type of novelty finish is created by adding ingredients which make the lacquer stringy or fibrous before it is used and then applying this stringy substance by means of an air gun. The result gives a peculiar airline tracery which, independent of the operator who is applying it, forms an interesting and varied design which nevertheless gives a fairly uniform effect over a large surface. This is known as a veiling lacquer.

Further unusual effects are secured in novelty finishes by spraying dry materials onto freshly coated surfaces and also by introducing foreign materials into the enamel just as it is being sprayed. One surface effect of this nature is known as Izarine, which is produced by spraying finely ground suede over a special size-coat. This gives a warm soft finish of an unusual nature.

Several other ways have been de-

Finish Helps Metal Products Sales

MORE spectacular than most other branches of metal finishing has been the development of novelty coatings in the lacquer and enamel industry. Purposely roughened and crinkly surfaces of uniform character have been devised by reversing research procedure. That is, instead of refining materials, investigators have devised means of systematically increasing impurities to produce novelty effects.

On the other hand, specialty finishes have called for great refinement in quality and character of the coating material, and this has led to increased scope and use of synthetic enamels. This article, which is the thirtieth in a series on metal finishes, describes many of the present-day popular novelty finishes and gives considerable detail covering composition and properties of synthetic enamels.

Acknowledgment is made to C. R. Bragdon of Ault & Wiborg Corpn., New York, for coöperation in the portion dealing with the ingredients and research work of modern enamels.

vised for producing unusual finishes. One is the silk screen process which is actually a modification of the use of stencils. A piece of silk stretched on a frame is prepared so as to leave open parts through which lacquer is brushed. Different colors may be successively used to create varying effects. In fact it is possible in this way, by using several different screens for the same design, to produce multi-color art work resembling printing or lithographing. Other experimenters have used copper stencils to create startling effects in applying lacquer to metal.

Methods of Application

A rapid increase in the use of lacquers and enamels in industry has created a demand for improved methods of application. At first, parts were dipped in tanks of enamel and then allowed to drain back into the tank before passing on to the baking oven. This method is still extensively used and for some work seems to have advantages. The most widely used method today, however, is spraying, and by carefully regulating the air pressure and using special nozzles it is possible to conform to well defined, simple patterns in multi-color work either by hand or automatically. Thus barrels or other metal containers may be revolved under a row of three spray nozzles, each supplied with a different colored lacquer, and the result will be clearly defined bands of color.

Conforming to the trend toward increased finishing of raw material at the mill, large coating machines have been developed to apply lacquer and enamel to sheets and strip metal in continuous operation. These machines consist essentially of two or more rolls between which the sheets are passed. One roll carries a thin film of lacquer onto the sheet and the other usually is uncoated and kept clean by means of a scraper. One advantage of a coating machine is a saving in the amount of material. A gallon of lacquer, for instance, will cover from 800 to 1000 sq. ft. of metal surface on a coating machine as against 300 to 400 sq. ft. with the lacquer spray.

Most spraying lacquers are about 40 per cent solid and in some large shops there has been a more or less

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THE development of lithographed surfacing of sheet metal has greatly reduced the cost of highway display signs such as this.

o o o

Courtesy Sherwin-Williams Co.

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THE operation here shown puts the final lacquer coat on decorative metal tubes. At this stage the tubes have already been lithographed and come to the operators from the drying oven on the endless chain conveyor shown above. They are taken off this conveyor by the girl at the left and placed on one of the ball bearing mounted spindles of a wheel fixture which carries them in a counter-clockwise direction past the enameling roller and up to a point where they are removed by the second operator.

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successful attempt to recover some of the volatile material which escapes in the spray booth. The solid material which collects around the booth is usually considered waste. Modifications in design of a coating machine roll may be made to give patterns or stripings on the sheets or strip being finished. Thus by merely cutting out a small band around the applying roller an uncoated strip will be left on the metal. Also a roller may be made up with several separated sections. Then by applying different colors to the different sections it is possible to apply multi-color band designs to strip.

Grain and Marble Effects

The process of transferring a grained design from actual wood samples to steel has been so greatly improved that on quality panels it is almost impossible to determine which surface is wood and which is metal, from appearance alone. The usual method of graining is to apply first a ground coat of the proper color for the background. This first coat may be a primer and an undercoat all in one, or it may be a primer which is later followed by an undercoat.

One of the large manufacturers of high grade furniture uses the following procedure: One combination ground coat baked at 250 deg. F. for 1 hr. Onto this is rolled the graining ink which consists of a combination of earth pigments, that is, umber, sienna and ochre, in linseed oil. The method of transferring the design is similar to that used in printing. The design is photographically reproduced on a copper plate which is etched and then inked or coated with the pigment and linseed oil combination. The plate is then scraped off with a straight edge known as a knife, leaving all depressed parts filled with "ink." A composition roller, usually surfaced with a gelatin or rubber base composition, is first rolled over the inked copper plate and then over the metal surface which is to be grained. The roller is of such a size that its circumference is equal to the length of the work which is to take the design. Thus one revolution completes the pattern.

After the design has been transferred it is baked at 250 deg. for 30 min. and then a top coat of synthetic enamel is applied and allowed to air-dry. Afterwards for certain types of work the surface is rubbed and polished. Marble designs are frequently transferred to steel by a similar method. The difficulty in this case is one of color as the effect of a ground coat over an entire surface may not reproduce the exact effect of the marble sample. Sometimes the ground coat itself is varied by the use of large shields or stencils.

A much more common way of producing a marble effect is the hand method. Skilled workers using quills, sponges, and other similar items are able to quickly produce surprisingly realistic modern designs. Hand graining for wood effects is also popular in the less expensive products. The grain is usually applied over the ground coat with the side of a feather and afterward the effect of wood pores is produced by using a brush. The final finish may vary from flat to high gloss, depending upon the type of top coat used.

Elastic Coatings

One of the outstanding achievements in coating steel sheets is the elastic finish produced by certain varnishes and lacquers. Because of the necessity of keeping cost to a minimum for such items as bottle tops and small metal containers, the manufacturers of enamels have been asked to produce a material which when applied in one coat directly on the metal will be of a character to resist subsequent deep drawing. This task which would have seemed impossible some years ago has now been accomplished.

A good example of such a finish is that used on catsup bottle tops. One of the most successful enamels of this character contains an excess of wax which comes to the surface during baking to leave a very thin film which serves as a lubricant under the action of forming dies. Lithograph work using the new elastic coatings has greatly extended the scope of forming and processing subsequent to surface finishing. The most important feature in this case is to have a flexible ground coating. The lithographing process consists of applying first a color coat, usually white, and then of printing the design in color over this ground coat. This is done in metal printing presses using printing ink which, as stated, is usually a combination of pigment and linseed oil. Elaborate automatic contiuous printing and drying operations have been developed to produce in several colors repeated small designs to cover the large flat surfaces. The small designs are later blanked out and formed into final shape. The original elastic coating on the sheet adjusts itself to the new contours and without

further processing becomes the final finish of the metal part.

The Hypothetical Ideal

The ideal paint, based on widespread demands of industrial engineers, should be flexible as rubber and tough as steel. It should be hard as flint and yet never brittle. It should dry almost instantaneously and yet set slowly enough for perfect leveling. It should be proof against strong acids and yet should be readily removable with gasoline. Despite the hypothetical character of such an ideal coating, it is possible today to apply a thin organic film but a few thousands of an inch thick over metal and have the resultant surface measure up to a surprising number of severe service demands.

Most industrial paints, strictly speaking, are not paint at all but enamel, which is a coating where the linseed oil or ordinary paint is replaced by a varnish, a synthetic resin, or a pyroxylin vehicle. In many industrial enamels the lead and zinc of architectural paints are replaced by other pigments which by scientific research and practical experience have been found more suitable for industrial use. Some of the common demands in the finish of metal products are resistance to heat, quick covering power, proof against chemicals, fumes and water, and low overall cost.

In the fields of both pigment and vehicle the variety of available enamel ingredients is tremendous, particularly as the result of chemical research during the past few years. The modern manufacturer of industrial finishes, in his endeavor to suit the individual requirements of a diversified list of customers, may use in the course of a year between 5000 and 10,000 different formulae in his research work. Each lot of material thus made, whether it be 2 gal. or 2 tons, must be thoroughly checked for quality and uniformity before shipping, and an average of more than ten tests for each sample may have to be made to properly determine its character. From this, some idea of the scope of activity of a large manufacturer of finishes may be had.

Synthetic Enamels

Even before the advent of pyroxylin lacquers, which placed such emphasis on production speed and which greatly influenced the development of synthetic enamels, there were certain industrial finishes which had surprisingly short drying schedules, especially where baking facilities were available. Even in the early days of automobile manufacture, black enamels permitted a body to be finished in 24 hrs., and tin decorating finishes, which bake hard in 20 min. at 200 deg. F., have been in existence for some ten years.

For some processes these early finishes, produced almost entirely from natural raw materials, remain in favor even today. Thus certain metal dipping enamels for metal toys have not been excelled by any of the recent synthetic coatings. For the great majority of uses, however, advantage is found by using one of the various types of new pyroxylin lacquers. One group of these employs a varnish made by cooking some form of phenol-formaldehyde resins with drying oils in much the same manner as formerly used with the natural resins. Another important group uses a condensation product of glycerine with one of the poly-basic organic acids such as phthalic.

A most recent type of the pyroxylin lacquers is based on a resin polymerized from ethylene gas treated with hydrochloric and acetic acids. Other recent developments in this line have been built up around one or more of the following materials: chlorinated rubber, thickened terpenes derived from the pine tree, a non-inflammable chlorinated product of coal-tar distillation. Each of these different materials tends to set up its own particular properties in the finished coating, and the advantages in one direction frequently entail some disadvantages in another, so that careful study is necessary to select the best material for each particular job. All of this emphasizes the difficulty ahead of the layman who attempts a choice, for the problem of selecting the best coating to suit any given set of conditions is difficult enough even for the experinced formulator.

The Ester Gums

Some years ago when boiling-water-resistant spar varnishes were developed from so-called ester gums, it was thought that a great advance into the synthetic field had been made. However, that was only the beginning. In a new direction some remarkable results have been secured by similarly esterifying with glycerine the acids of the fossil gums. Research in another field has had to do with solutions of the phenol-formaldehyde resins in oils. This has resulted finally in the discovery that by incorporating abietic acid with glycer-

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THIS machine applies simultaneously two bands of different colored lacquers to small metal containers.

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Courtesy Sherwin-Williams Co.

ine, with properly selected phenols and aldehydes, solubility in quick drying oils was possible. All of which is very complicated and confusing to the average user of modern lacquers. The net result, however, is that the manufacturer of metal products today is able to secure a coating which will dry faster and harder than anything possible a few years ago, and yet which will not sacrifice flexibility or heat and water resistance.

Impartial tests of some modern coatings have been conducted by the Pittsburgh-DesMoines Steel Co. in cooperation with the City of Ambridge, Pa. Invitations were sent to all the known suppliers of industrial and maintenance coatings, asking for the best systems for coating the inside of an open-top 1,000,000-gal. tank which was to be kept full of water. The water in this particular case happened to be more corrosive in character than most water supplies. One hundred and ninety-six coating systems were offered and these were applied in vertical strips in the inside of the tank shell. The tank was then filled with water and after a 16-month period was drained for inspections. Of the six strips receiving the highest ratings, four were of the series using 100 per cent phenolic base coatings.

Many of the new coating formulae give excellent color retention under heat and on exposure, and a high degree of durability to ordinary weather. Some of them adhere particularly well to metals from which most other coatings peel readily, and others set quickly in combination with good brushing characteristics, so that an approach toward that hypothetical ideal definitely has been established.

New Combinations

In coating of metal products it is now entirely practical to spray a lacquer finishing coat within an hour or less after the primer has been applied. By proper selection and formulation it is now possible to combine on the one hand the phenolic and on the other the alkyd types of resin with pyroxylin directly and thus derive two new classes of enamel that dry faster and harder than the straight resin products, with little detriment to luster, fulness or durability. Such finishes are in particular demand for metal furniture, as they blend the best properties of both components and come close to being the ideal coating for metal products for average indoor use. Expense of application is small as no heat is necessary, although desirable in some cases for extra speed.

Another group of synthetics marketed under the trade name of Vichrome comprises both air-drying and baking types and has excellent resistance not only to acids and water but also to alkalis and alcohol, and to iodine and other antiseptic solutions. This type is well adapted to use for hospital and laboratory furniture, for battery racks and for metal wall tile. It exhibits toughness and resistance to abrasion and thus seems, next to the porcelain enamels, the most popular coating for refrigerators and washing machines. A further recent development is the use of an enamel of this combination of air-drying and baking types for finishing of automobiles.

Research on Synthetics

Research in the field of synthetic enamels has been so extensive during the last few years that it may be said that almost every available source of complex molecular structure has been investigated and a resin made from it. One of the picturesque sources is the oil of the cashew shell, from which a successful coating for metal exposed to severe acid conditions has been derived. Petroleum, corn-cobs, and sludges from many industrial processes also have yielded resinous materials that have been made into coatings, many of which have not yet reached commercial application.

The question is often asked, Why do synthetic enamels dry faster and harder than the old oil-base enamels? No simple answer is possible, but in general it may be said that synthetic materials dry largely by evaporation of their solvents, as lacquer does, and by molecular rearrangement, both of which processes can take place quickly, especially when aided by heat. Unlike the old oil-base enamels, they do not have to go through the slow process of absorbing from the air about one-fifth as much oxygen by weight as there is oil in the base. The forces of intramolecular attraction that hold the minute particles together in the case of the synthetic product are stronger and less subject to attack by alkalis, and the fact that a practically completely saturated compound is formed at once, leaving the molecules no appetite for further absorption of oxygen or for further

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Courtesy Sherwin-Williams Co.

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NOT only does a bright finish on tank cars afford publicity but it has practical value by radiating the sun's heat thus keeping contents at a lower temperature and reducing loss by evaporation. This car was coated with silver-bright poster and bronzing liquid.

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Conveyor Transportation in Continuous Strip Mills

BY M. J. ANDERSON
Chief Engineer, Mathews Conveyer Co.

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THE steel industry is fast becoming conveyor minded. It has found that transportation is a principal part of the production process and that its mechanization is as profitable as that of the more direct and obvious production steps. In this article, Mr. Anderson traces the interesting transportation sequences that occur in a mechanized continuous strip mill. While his description is confined to a specialized process, the ideas involved have broad application in other branches of metal working.

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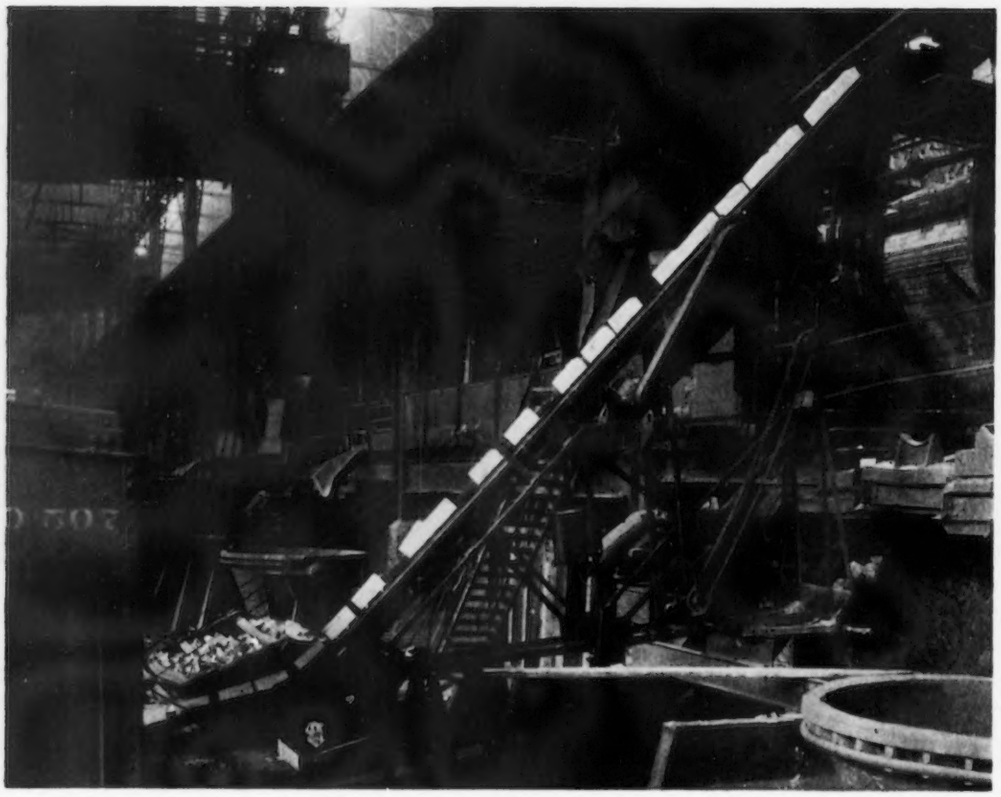
THE leaks incidental in the routing of materials through a plant are often the source of the high costs that materially reduce the margin of profit and are the big stumbling blocks to well-equipped and well-managed concerns. Men are too often employed to move materials and products in and out of buildings and between departments and processes in industrial plants, where, with proper planning, mechanical methods could be used, thereby placing these men in more productive positions.

The direct cost of the survival of hand methods in the handling and moving of materials is only a fractional part of the total cost. Much greater are the costs due to delays in production and delays in distribution of commodities in the process of manufacture, assembling and shipping, and in the extra space consumed by goods in process which are not kept moving. In many plants, costly machines tended by highly paid skilled workmen are supplied with materials by hand methods. Quantity production is hampered by being fettered to manual handling. While one operator waits for material, another has so much stock on hand that it gets in his way and impedes him in his work. In many departments of the plant there can be such an accumulation of boxes, packages, materials, and products that orderly movement is impossible and workmen are seriously handicapped. The stock in process is greatly increased as quantities of materials pile up at each machine, or production unit, clogging the aisles and working space with parts in waiting that should be in work, thus tying up capital and sacrificing floor space.

Especially during periods of industrial activity truckers cannot always keep machines supplied with stock and maintain an even flow of material through the plant. Many of the difficulties in industry can be traced to obsolete handling methods, where conveyors would accomplish more at considerably less cost. This is one of the chief reasons why it is increasingly difficult to secure more production, why costs are rising, why the stock in process account is large and why it is so difficult to rush through emergency orders. The great need in many plants is to put the handling and carrying on a modern basis.

Many executives have recognized the value of conveyors for interior transportation and are classing them on the same footing as manufacturing processes, on a quantity production basis. Conveyors link machines, processes and departments, so that product moves through the plant quickly, smoothly, and in logical order. Their application permits the routing of materials and containers without



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THIS picture may be said to portray the demise of the hod carrier. Here we see fire brick being mechanically transported from freight car to furnace, with no stops en route.

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interruptions which break the regularity and therefore the momentum and efficiency of steady work. They save useless steps and bring about increased production with reduced expense. They are far more than carrying devices; they provide live storage and are often synchronized to processing operations or to machines. With the use of conveyors, operators are not obliged to wait for material, and are not obstructed by an accumulation of unfinished or finished parts around them. A continuous supply of material is constantly at hand while working on one piece or a group of pieces, and the finished material, as soon as produced, passes along to succeeding operations. Work is often performed as materials or parts pass on a conveyor past the workman, thus setting the pace for production and making it easy for operators to perform their function.

There are many materials processed or items manufactured wherein the total cost is made up largely of labor, of machine labor, and handling labor. Such a classification would cover a wide scope and would range from very light manufactured parts to fruit and vegetable-handling, to heavy foundry work or the steel mill. Present day practice can fit conveyors to practically all conditions as to quantity, capacity, weight, and physical limitations of plant and equipment. To get the best results it may be found necessary, in some cases, to rearrange machines or regroup operations.

Steel Mills Now "Transportation Minded"

It is only in recent years that steel mills have given serious consideration to the full possibilities of conveying equipment and the advantages that accrue through their use. Many steel mills today are very well equipped with conveyors, especially in the sheet mill departments. These conveyors are speeding up production, acting as pace-makers, and in many cases serving as production units. Many operations are facilitated by conveyors or by auxiliary mechanism associated with the conveyors.

An outline of the movement of materials in a continuous strip mill will serve to bring out how conveyors are utilized in the various processes. In the open-hearth building where the ore and alloys are compounded, handling is mainly accomplished by means of industrial railways, cranes and furnace-charging machines. Even here, however, the modern mill has recognized the advantages of conveyors. Much fire brick is received, stored, and used for relining furnaces. For the handling of this brick from cars to storage and from storage to furnaces, gravity roller conveyors are used, working in conjunction with a portable and adjustable inclined brick elevating conveyor. This combination permits a flexibility in handling over a wide area and at various elevations. Portable sections of roller conveyor are connected at either or both ends of the portable elevating unit to permit receiving and delivering of brick for convenience of workmen.

Ingots weighing many tons are poured from large ladles filled from the open-hearth furnaces. These are cooled in their molds on suitable cars and delivered to soaking pit building, where molds are removed. After the required heating period the ingots are delivered by crane from soaking pits to the blooming mill where they are slabbed down to required thickness for the continuous mill.

Driven rollers supply the conveying means for ingots as well as for the slabs. From the blooming mill the slab continues on roller table to the shear, where slab ingots are sheared to the required size for rolling.

At this point the sheared slabs are kicked out from roller table to a cross-conveyor, usually of multiple strands of heavy chain. From the discharge of this chain conveyor, the slabs slide on to a cross-conveyor in

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PACKS or bars start their journey to the mill through the impetus of a live-roller furnace run-out table. The herringbone design centers the pack

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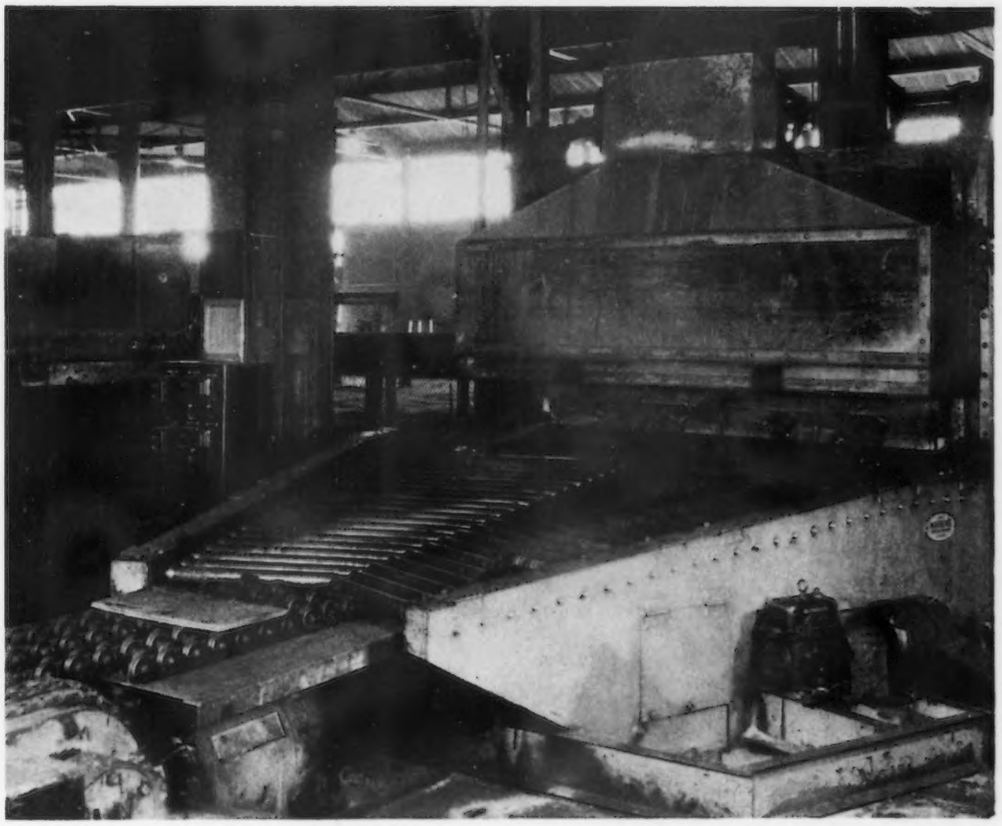


front of the reheat furnaces. These furnaces supply slabs to the continuous mill in order as required and they are used as a bank between the blooming mill and the stands of the finishing mills. When reheated slabs are discharged from these furnaces, they slide from the furnace, which is at somewhat higher elevation, to the main mill delivery tables. These tables, as previously mentioned, are roller tables, and, in many cases, rollers are driven by individual motors.

A typical stand of mills would include ten mills with a maximum delivery speed at the last mill of around 1200 ft. per min., depending on the thickness of sheets being rolled.

A long line of roller table extends from the delivery of the last mill to carry the strip to coilers, where each long strip is wound into a coil.

Strip of standard commercial gages, that is, not to be coiled, can be transferred from this long roller table by means of a multiple strand chain conveyor passing between rollers of the roller table. Suitable lugs on the chain pull the sheet off the rollers. These chains extend some distance and serve as a cooling bed for strip that is to be sheared to short lengths. At the end of these chains the strip is deposited upon another driven roller table. On this table, strip is conveyed through the flying shear and cut to commercial lengths. A short distance beyond the discharge of the sheer the cut sheets are stacked on gravity roller tables and as stacks are completed they are conveyed to squaring shears or edging shears, roller levelers and to the shipping departments, where they are distributed or loaded to cars by means of crane equipment. Rather extensive lines of roller conveyor are used for these connections. Electrically or air-operated brakes are included to permit stopping of the stacks as required. Similar lines are also used to permit transfer from one crane bay into another.

When the strip is intended for the coilers, the cross chains of the cooling bed are inactive, which permits through travel of the roller table.

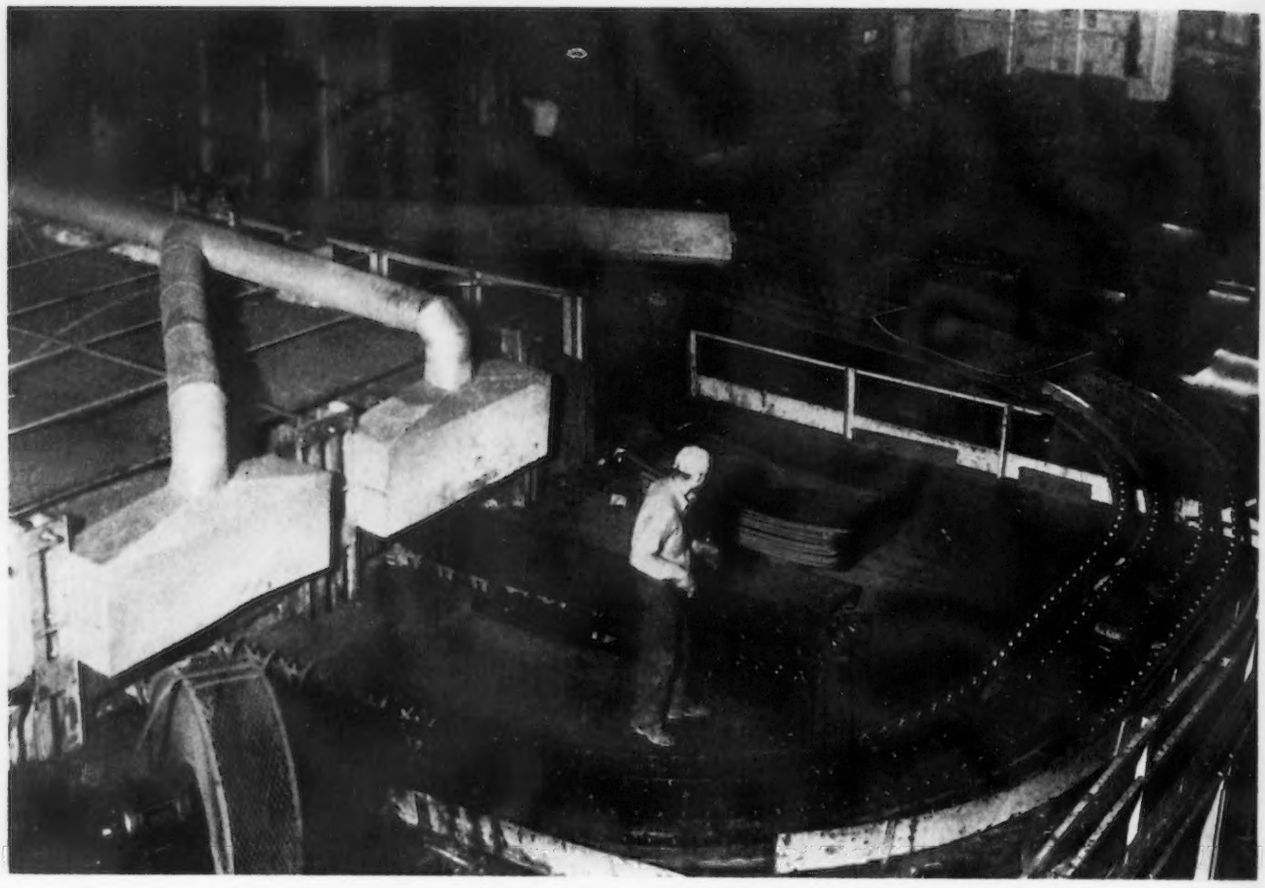
Coiling Strip Steel

Two coilers are used to handle the capacity of the mill line, each taking every second strip. The coils have a core diameter of about 2 ft. and an outside diameter varying from 32 in. to 48 in., depending on the mill and coiler capacities in the different mills. Coils vary in weight from 3000 to 10,000 lb., according to diameter and width of strip. Strip up to 72 in. wide is being rolled in a number of present-day mills and several are rolling strip up to 84 in. wide.

As the coiler finishes a coil it is peeled automatically off the coiler reel and deposited upon a conveyor leading to the hot coil storage. While in transit it passes over a section of roller conveyor set on a scale platform where an attendant records the weight and also marks the weight with chalk on the coils. In most cases the coils are deposited upon these conveyors with the cores vertical and are handled from conveyor to storage piles by means of crane and magnet. In many cases coils are tied with heavy wire while on the conveyor to facilitate handling.

Because different types of coilers are used in different mills and because of different crane equipment and piling methods, coils are often discharged from coilers with the core axis horizontal. This requires a different type of conveying means and instead of magnet pick-up, a single hooked finger is used. In some cases the magnets handle three coils at a time and the fingers two at a time. The fingers are inserted into the core of the coil.

Where the distance for strip run-out is limited, for some classes of narrow strip a somewhat modified type of equipment is employed from the discharge of the last finishing mill. In such cases the strip is passed



At the loading end of the normalizing furnace we see this wheeled conveyor bringing on the sheet packs.

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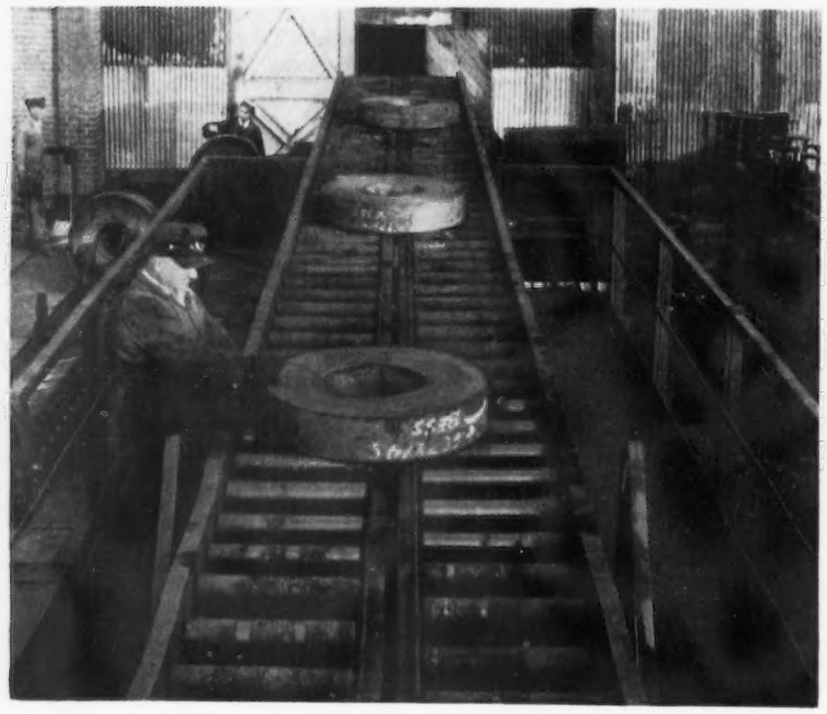

THIS is an example of the transportation, by conveyor, of strip steel coils with perpendicular axes. The coils are on the way to storage.

through a twist spout, located close to the mill rolls, which turns the strip from a horizontal to a vertical position.

These twist sprouts are constructed with heavy frames and with two levels of hardened and ground rollers mounted in precision bearings accurately machined and fitted and well lubricated. By means of a continuation of this construction with vertical rollers, a power-operated switch is provided to permit two separate discharge locations. Two discharges are required to provide connection to two coilers. Each coiler handles every second strip.

As each strip is delivered on edge through the pinch rollers at twist spout discharge, a reciprocating lever and roller causes it to assume a serpentine track upon the apron conveyor on to which it delivers. These apron conveyors, one for each coiler, are about 5 ft. wide and of sufficient length to hold the full strip in its serpentine form. They make the connection from the twist spout to the coil-

(CONTINUED ON PAGE 66)

New Type Solvent Machines Used To Clean Metal Parts

By G. E. POWERS

Secretary and Treasurer, Rex Products & Mfg. Co.

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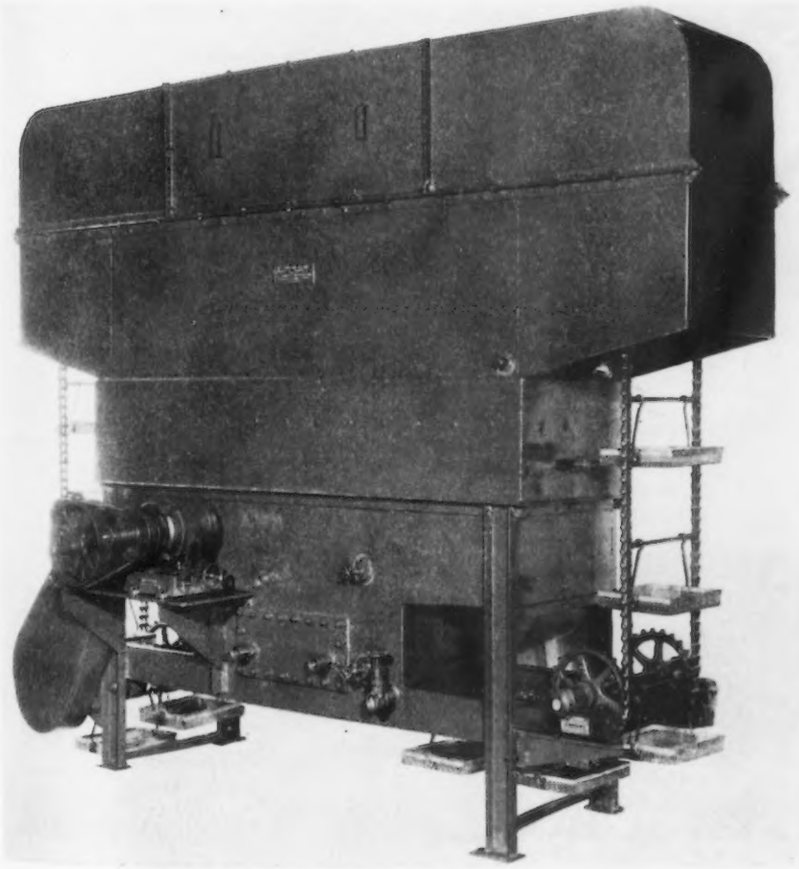
THIS hand-operated solvent machine, of the immersion type, is installed in small shops for cleaning small parts.

OLD methods of cleaning metals by means of alkaline solutions or by the use of the explosive and dangerous solvents, gasoline or benzine, are rapidly being replaced by the employment of stabilized chlorinated solvent in properly designed machines, thus eliminating excessive losses of the solvent.

The design of the solvent machine and the method of degreasing depend upon the size of the parts, the gage of the metal to be cleaned, and the amount of work to be cleaned in each working day. The machines vary from small manually-operated ones to large automatic machines. The metal may be cleaned by solvent vapors, by immersion in the boiling solvent, by the solvent being sprayed or pumped upon the metal under pressure, or by a combination of any two or more of these methods of cleaning in the same machine.



THIS vapor-type solvent machine, equipped with variable speed conveyor, is used to clean small parts in the plant of a large automobile manufacturer.

The vapor system is the simplest form of solvent cleaning, being satisfactory when oil or grease is the only foreign matter to be removed. Metal parts to be cleaned are suspended in the machine below the condensing surface. Due to the difference in temperature, the solvent vapors condense to a liquid on the cold surface of the metal parts to be cleaned. Metallic surfaces are thus flushed free of oil or grease, and when the metal parts become heated to the temperature of the vapors they are slowly removed from the solvent machine perfectly dry.

All cleaning action ceases when the metal in the vapor becomes hot. Because of this fact the machine is most suitable for removing oil and grease from gears, crankshafts, flywheels, connecting rods, stampings, castings, and other heavy parts. Good results also are obtained with thin-gage metal where the oil on the parts consists of a thin film.

The immersion type of machine has

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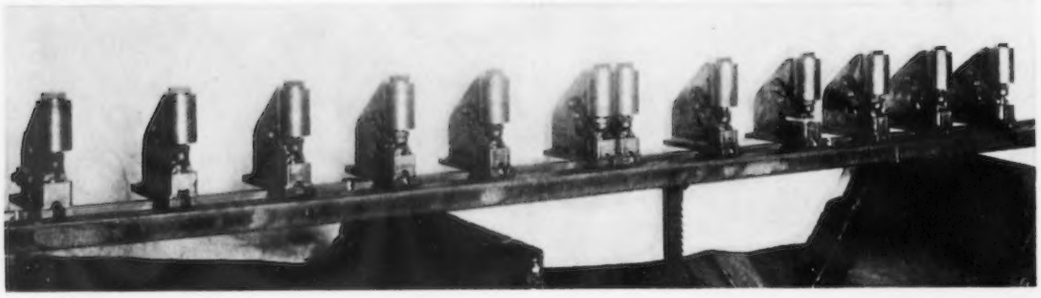

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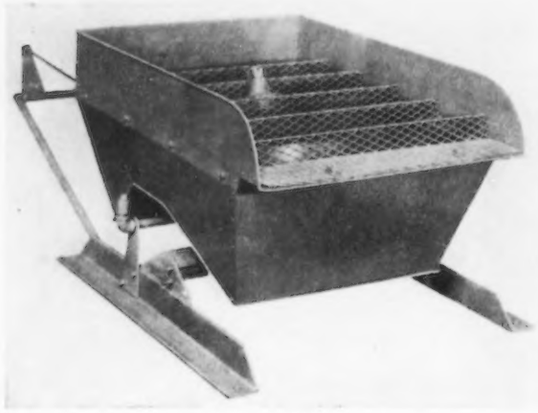
MULTI-UNIT PUNCHES IN SERIES ARRANGEMENT and for use singly or in combination as well have standardized dimensions thus permitting interchangeability and additions to stock supply as desired.

See page 34, column 1



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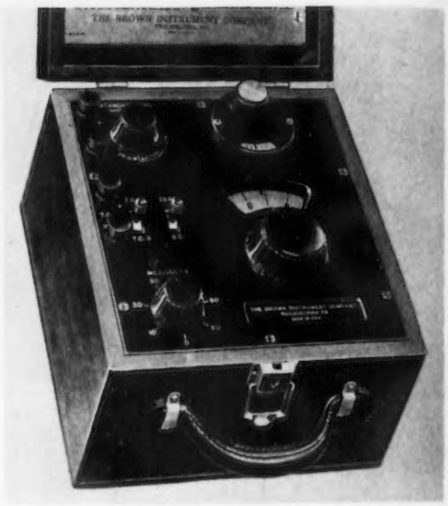
NEW SCREEN HAS GYRATORY MOTION—The combination of all sifting movements is described by the maker as "gyratory."

See page 34, column 2

AT RIGHT

NEW PORTABLE POTENTIOMETER, embodying in design the equivalent of a slide wire 109 in. long, is mounted in a fully inclosed case 9⅜ in. wide by 10¼ in. deep by 6¾ in. high.

See page 35, column 2



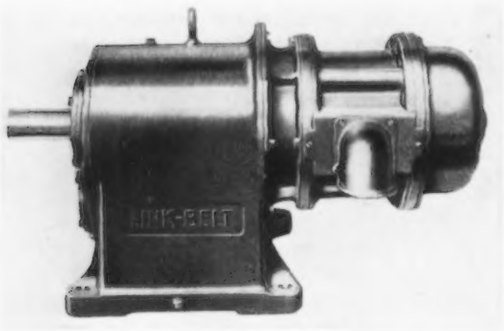
BELOW

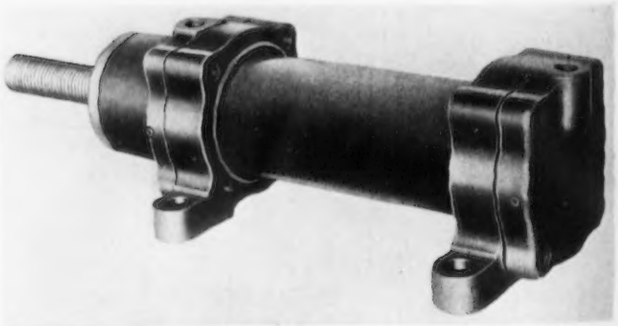
SPEED REDUCER ADAPTER SUPPORTS MOTOR SHAFT—This design not only provides shaft support, but provides for accessibility to motor and to high-speed gears without disturbing the gear train.

See page 34, column 2

HYDRAULIC CYLINDERS FOR HIGH PRESSURE SERVICE—Tie rods are eliminated and end caps can be turned and positioned to locate intake-port with reference to convenience.

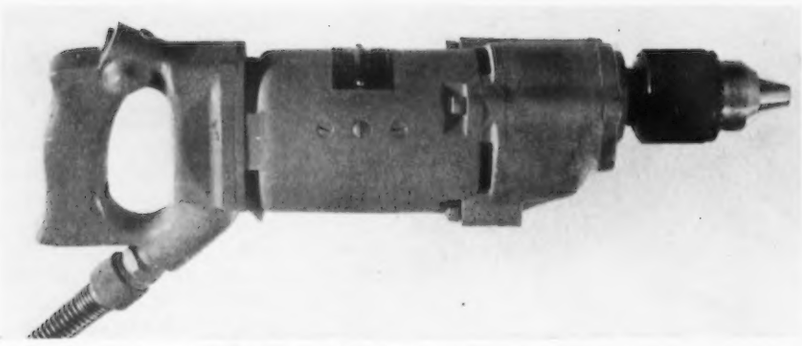
See page 35, column 3



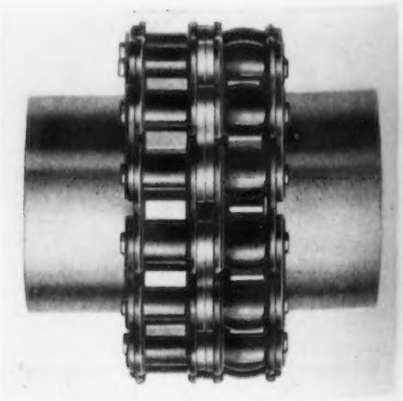


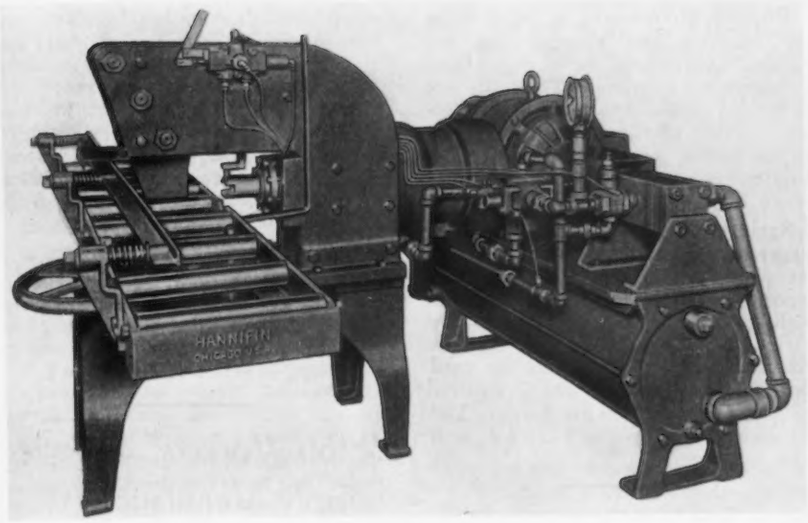
BELOW—**CHAIN COUPLING FEATURES FLEXIBLE ALINEMENT**—A two-strand roller chain, using two types of rollers, compensates for shaft deflection or misalinement.

See page 35, column 3



ELECTRIC DRILL FOR GENERAL UTILITY.—This new Hercules high-frequency portable unit is offered by the Buckeye Portable Tool Co., Dayton, Ohio, for general purpose use. It has a speed of 800 r.p.m. and capacity of ⅜ in., or ½ in. light drilling.



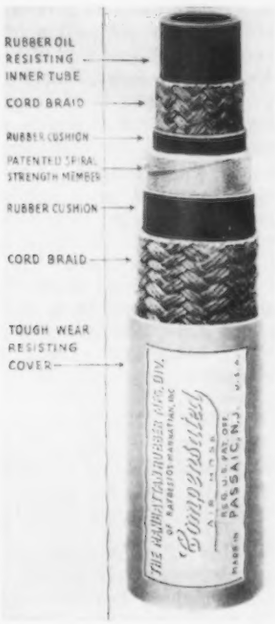


ABOVE—**MULTIPLE RIVETING PRESS HYDRAULICALLY OPERATED**—A special 50-ton riveter for use in riveting crawler type tractor frames completes the riveting of several rows of ¾-in. hot rivets during a cycle which is automatically completed after movement of the starting valve lever.

See page 34, column 1

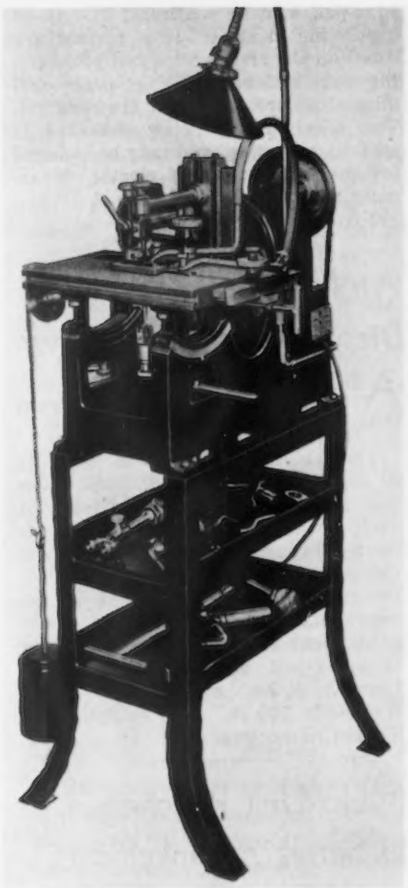
MULTIPLE BURNER UNITS FOR OIL FURNACES—Several burner units, as required, may be employed to give control of furnace atmosphere.

See page 35, column 1



PLY STRESSES COMPENSATED IN NEW AIR HOSE—In the building up of this air hose, materials have been used which are said to permit disregard of pressures.

See page 35, column 1



ABOVE

AIR NOZZLE EMPLOYED FOR DIE-CUTTING HOLD-DOWN—In addition to serving in the removal of cuttings, the air nozzle used with this machine holds down the work, close to the point of cutting action.

See page 34, column 1

"HOT-WORKERS" GOGGLES SUPPLY VENTILATION—In addition to the other factors of safety involved in the use of this equipment is air ventilation behind the lenses.

See page 34, column 3

AT LEFT

PLATING EQUIPMENT EMPLOYS PATENTED BALL ANODES—This rheostat is a part of new tank plating equipment.

See page 34, column 3

Multiple Riveting Press Hydraulically Operated

THE Hannifin Mfg. Co., 621 South Kolmar Avenue, Chicago, recently completed the installation of the special 50-ton riveting press pictured on page 33. The design covers the heading of several rows of ¾-in. hot rivets on crawler type tractor frames. In operation the work is advanced between the dies on a roller bearing equipped conveyor which is vertically adjustable for alining the various rows of rivets with the dies. The riveting cycle is completed by movement of the starting valve lever; the ram advances, first actuating a pressure pad, and its continued movement heads the rivet; after a momentary dwell on the rivet under full pressure, the ram automatically reverses and idles at no pressure after the reversal. The maximum working pressure is 1600 lb. per sq. in. and may be reduced for the smaller run of rivets. Maximum ram travel is 5½ in. A 10-hp., 900-r.p.m. motor is used.

Air Nozzle Employed for Die Cutting Hold-down

A NEW die-making machine with 6½-in. throat is announced by the Foley Mfg. Co. Inc., Minneapolis.

The table is 9 in. by 14 in. and tilts 20 deg. front and 10 deg. back. The ram tilts 20 deg. right and left. A pump within the machine supplies air blasts through an air nozzle which also serves as the hold-down member. Power feed is specified as 12 in. between blade and feed finger; stroke adjustment as 0 to 4 in. The drive is by V-belt and four-step pulleys from a ¼-hp. motor, 1725 r.p.m. Weight is 260 lb. The equipment is illustrated on page 33.

Multi-Unit Punches In Series Arrangement

A LINE of standard "Multi-Unit" punches has been placed on the market by the Service Machine Co., 162 Miller St., Elizabeth, N. J. These are designed primarily for use in presses or press brakes in place of the usual multiple punching attachment.

The illustrations on page 32 show the design of a single No. 4 unit and the arrangement of a series of units on the bed of a power press brake.

The multi-unit punch is clamped on any centers in the press without necessity for realining each individual punch and die. The unit avoids investment in a multiple punch attachment when only a few holes are required. All units are held to a standard so that additional units may be added to stock.

Punches are removed by unscrewing the coupling and slipping out the punch. Adjustable back gages and strippers are provided. The units are of welded steel. Adapters on the bottom surface of the unit and tongues on the piston can be machined to the requirements of the machine with which they are to be used.

Spring-return units are available where direct connection to the ram of the press is not desired. Sizes and types are alike in essential dimensions such as height from bottom to die bushing and overall height, so that different sizes of units can be used alongside each other where smaller holes at closer centers are desired. The depths of throat provided are 4 in. and 6 in.

New Screen Has Gyratory Motion

THE Beardsley & Piper Co., 2541 North Keeler Avenue, Chicago, announce a new all-purpose screen said to operate with a combination of circular, vertical, oblique and forward and backward movement, described as gyratory. The screen is of large capacity per square foot of screen area. Eliminated necessity for crushers and lump breakers is claimed. Lack of vibration is featured, as is minimum head room and space requirement. Operating mechanism is dust-sealed. Screens are easily and quickly changed. A 1 hp. motor is employed. The equipment is made in a number of types and sizes, with capacities of 70 tons per hour and over. Illustrated on page 32.

Speed Reducer Adapter Supports Motor Shaft

A NEW line of motorized helical-gear reducers, an outstanding feature of which is the accessibility of the motor and the high speed gears, is being offered by Link-Belt Co., Chicago. Illustrated on page 32.

A standard round-frame motor, conforming with National Electrical Manufacturers' Association specifications, is secured to the reducer housing by means of an adapter casting which supports the motor shaft, in oversize anti-friction bearings, close to the pinion, assuring alinement and mesh of pinion and gear. The complete motor, with adapter and motor pinion, can be removed as a unit for inspection or maintenance, without disturbing alinement of the motor, or of the gears remaining in the reducer housing; in fact, the motor pinion and gear are removable without disconnecting the driven machine or disturbing the low speed gears.

All gears are of the helical type, with teeth cut from heat-treated alloy steel. Anti-friction bearings are used throughout. The low speed shaft and its bearings are designed to carry overhung loads. A well-braced and ribbed gray iron housing provides rigid mounting for the bearings, shafts and motor, as well as a liberal-sized reservoir for automatic lubrication of the gears and bearings. Seals are provided at shaft openings.

The new motorized reducers may be mounted on floor, ceiling or wall; and are available in double reduction for ½ hp., to 75 hp., in ratios up to 38½ to 1, and in triple reduction up to 30 hp., in ratios up to 292 to 1.

"Hot-Workers" Goggles Supply Ventilation

NEW goggles for the use of "hot workers" and having an unusual area for ventilation are being marketed by the American Optical Co., Southbridge, Mass. As readily shown by the cut on page 33, there is a very considerable ventilation in back of the super armorplate lenses which also feature this safety equipment.

Plating Equipment Uses Patented Ball Anodes

IN the further development of its plating equipment, involving the use of ball anodes described in THE IRON AGE of July 12, 1934, the Udylite Co., Detroit, announces a plating tank rheostat shown on page 33, which is said to embody close current regulation. The assembly of the rheostat includes self cleaning, constant pressure, cam type switches which are designed to provide correct contact at the low plating voltages through the grinding of the switch leaves with the switch in closed position. Additionally, the makers stress the following points of switch perfection: lack of distortion due to pressure, application of pressure perpendicularly to the contact surface, and equalized pressure on all leaves. The inner and outer leaves are of heavy spring bronze, the current carrying center leaves are of spring brush copper. The design involves a wiping, cleaning action by the leaves on the surface of the bus. Accidental sparking is avoided.

The resistors are of helical coiled nichrome wire; the low amperage coils, which generally receive the hardest service, are over-dimensioned for higher voltage drops. Coil brackets have unusually large radiating surface resulting in cooler contacts of the resistor coils.

Cooling of the resistors is accomplished by a chimney draft action; cool air is drawn upward through the resistors inclosed on four sides by the

rheostat casing. Udylite-cadmium coatings are used on all contact surfaces to permit positive transmission of electrical current. All metal parts, with the exception of switch leaves and resistance coils, are Udylite to eliminate electrolytic corrosion as a result of contact between dissimilar metals.

Ammeter and voltmeter are securely fastened on the front of the board and are in full view of the operator. The ammeter shunt is located below the resistors, away from the heat. A double throw, single pole, voltmeter switch is mounted on the rheostat to permit reading of the voltage drop across the tank and across the line. Symmetrical arrangement of switches, instruments and fastenings, together with the silvery luster of the Udylite parts, presents an attractive contrast against the black background of the panel.

Ply Stresses Compensated In New Air Hose

A NEW air hose, possessing the advantages of both wrapped duck and braided hose, has just been announced by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J.

In the new construction, for which patents have been applied, the unequal ply stresses set up in the wall of the hose by longitudinal and lateral tension incident with operation, are compensated and made equal. This is accomplished solely within the construction, which consists of two strength members, a braided cord member for longitudinal stresses, and a spiraled strength member for expansion and lateral stresses, both welded in tough age-resisting rubber.

By this balanced construction, chafing is largely reduced and the effects of surge and pulsation are resisted. Compensated air hose, it is said, permits that present-day working pressures may be disregarded.

Multiple Burner Units For Oil Furnaces

REGULATION of distribution, velocity and turbulence of both primary and secondary air flows as they come into contact with oil, are said to be features of a low pressure oil burner announced by the Philadelphia Drying Machinery Co., Philadelphia. The unit is pictured on page 33. Close control of furnace atmosphere is attained through the use of a number of burners, using a small quantity of oil in each.

Oil enters through a small supply line at the back, passes through a central oil tube to a distributor inside the burner housing, where it is directed into an oil chamber surrounding the primary air orifice. Air enters through a butterfly valve in the lower center section of the burner housing, from where a part of it enters the distributor head and passes through a venturi pipe. This creates a vacuum in the oil chamber so that the oil is withdrawn in a thin film around the air. This film is broken into a fine mist and thoroughly mixed with the primary air as it passes through the venturi mixer.

The secondary stream of air flows between the burner body and the outside of the venturi mixer. It is given a whirling action and is then discharged through the orifice near the nose of the burner. At this point it acts on the primary mixture to provide further atomization and mixing. Variable capacity is obtained by turning a hand wheel at the back of the burner, which causes the venturi pipe to move longitudinally and thus to vary the secondary air opening at the nose of the burner.

New Portable Potentiometer

THE Brown Instrument Co., Philadelphia, has announced a new portable potentiometer designed to enable pyrometer users to check their potentiometers, millivoltmeters and thermocouples quickly and accurately. The instrument is shown on page 32.

The combination of a step-switch and slide wire makes it possible to read the indicating scale to 0.01 millivolts over a total range of 71 millivolts. This step-switch and slide wire combination is equivalent to having a slide wire 109 in. long. The indicating scale is 17 in. long, making the smallest scale division (0.05 mv.) over 1/16 in. in width.

A fully inclosed, suspension-type galvanometer is used. Having a very short period (approximately 2 sec.), readings can be taken rapidly, as the galvanometer responds immediately when dial is moved to a new position. Two sets of binding posts and a toggle switch, provided for thermocouple checking, further facilitate taking check readings quickly and accurately.

The potentiometer circuit has been designed primarily for checking pyrometers and thermocouples. In addition, this new portable potentiometer can be used as a measured source of e.m.f. in checking recording potentiometers of the self-balancing type. The circuit draws only three milliamperes from the dry cell, giving the dry cell a life of several months and permitting the instrument to be used for several hours on one standardization of the battery current.

The device is 9⅜ in. wide x 10¼ in. deep x 6¾ in. high, and weighs 12¾ lb.

Hydraulic Cylinders for High Pressure Service

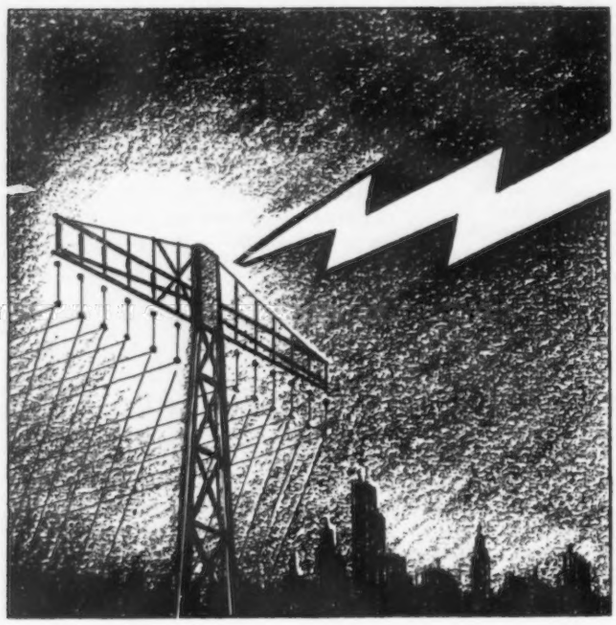
A NEW line of double-acting cylinders for high pressure hydraulic service has been introduced by the Hannifin Mfg. Co., Chicago. The illustrations shown on page 32, show an exterior view and are available in numerous types and in a wide range of sizes; standard models are designed for working pressures up to 1500 lb. per sq. in. with a wide range of stroke length.

Tie-rods have been entirely eliminated. Cylinder caps can be removed without disturbing the mounting, thus facilitating replacement of gaskets and rendering the internal parts more readily accessible. End caps can be turned so that the inlet port is at the top, bottom or either side; also each end cap can be positioned independently of the other, making it possible to locate the inlet port at the most convenient point with reference to the machine upon which installation is to be made. Air vent plugs are provided on each side of each cap so that when the cap is mounted with the inlet port at either side or the bottom, there is always an air vent plug on the top or upper side.

Cylinders are available either with a small diameter piston rod or with a 2 to 1 differential of the piston area; in the latter case the area of the piston on the piston rod side is substantially one-half of the large side.

Chain Coupling Features Flexible Alinement

THE patented flexible chain coupling, illustrated on page 32, has been announced by Baldwin-Duckworth Chain Corpn., for providing flexibility through the use of special double width roller chains. One strand of the chain is equipped with standard cylindrical rollers and the other strand has convex surface oversize rollers which provide for free operations where shaft deflection and misalining exist. It is said that permanent shaft deflections up to three degrees can be handled without undue strains, thus taking care of shaft joints with wabbles or permanent eccentricities. Flexibility is attained at all times because of the self-alining design in which the individual chains are separated by the center links of the double width chain, eliminating loose tolerances; necessity for oil tight casing or housing is avoided.



NEWS OF THE WEEK

MAPI Begins Survey of Machinery Needs In All Major Industries

THE Machinery and Allied Products Institute has inaugurated a survey of the extent to which plant replacements and additions of machinery and equipment have accumulated in American factories and other enterprises during the five depression years. Various estimates have been made, based mainly on speculation. The object of the new MAPI survey is to remove the speculative element as far as possible and by measuring the requirements of a limited, though fairly large, number of representative companies in the capital goods industries, to find an accurate basis for computing the volume of pent-up orders throughout those industries as a whole.

An interesting study of the same problem was contained in an article by Dr. Frederic Dewhurst in THE IRON AGE, Jan. 3, page 185. He pointed out that the huge latent demand for durable goods is the key to recovery, and will discuss the subject further in an early issue of THE IRON AGE.

As a start, the MAPI has distributed confidential report forms to its members in the machinery industry who normally do a $750,000,000 annual business. Replies are now coming in to MAPI headquarters at Washington. Approximately 95 per cent of the several hundred responses already received assert that replacements will be made as soon as it is clear that business confidence has been restored and credit reestablished. Individual estimates of the replacement needs range from a few thousand dollars in small plants to several hundred thousand dollars in some of the larger plants and to $1,000,000 in the case of one company, and $2,000,000 in another.

First returns thus disclose the presence of a large amount of delayed business, awaiting only clear indications of better times to be translated into actual orders with their resultant reemployment and acceleration of business all along the line through transportation to raw materials.

Other Organizations Solicited

The second step undertaken by the MAPI is the enlistment of the cooperation of other national trade organizations in the survey. Letters have been sent to such outstanding groups as the manufacturers of farm machinery, electrical machinery, fabricated metal and the graphic arts industries, requesting their aid, where practical, in measuring the dammed-up machinery demand in their enterprises. With the help of these organizations, the basis for the projected measurement of the pent-up demand will be broadened correspondingly.

A third step, contemplated by MAPI involves a wider distribution of the survey in its own membership and the translation of the prospective volume of new business into terms of man-hours of employment. It is anticipated that this will be under way within a month.

When the work is completed, the MAPI hopes to be in a position to announce a fair estimate of the total volume of prospective orders for machinery and equipment in the capital goods industries. By measuring the actual demand of several thousand representative companies, it is believed that it will be possible to chart, with reasonable accuracy, the requirements of the 150,000 companies engaged in the production of all durable goods.

The early returns to MAPI are almost unanimous in indicating that the prospective demands for machinery will run to tens of billions of dollars. For five years, replacements, in the main, have lain dormant. Until 1930, industry absorbed $8,000,000,000 worth of new machinery annually. Since 1930, the volume has declined to a minus 75 index or to a paltry $2,000,000,000. The tenor of replies bears eloquent testimony to the prevailing belief that the capital goods industries have been hit as hard by the depression as any other line of American enterprise.

Responses received thus far disclose that in many plants worn-out and nonproductive machinery is occupying valuable space; that rapid deterioration has occurred in many others closed down and boarded up; that a considerable proportion of the machinery operating with fair return to owners in 1929 has become obsolete since then; and that new methods of factory management spawned in the hot competition of depression years now are calling for new machinery to replace that outmoded since the depression began.

The belief also is voiced in many replies that not only will extensive replacements be necessary for the new competition, but that generous additions to plant machinery will be essential when demand for capital goods swings into the stride of near-normal times. Analysis of early responses discloses a wide spread in requirements, with machine tools, power plants and power line transmission frequently mentioned. Handling and service equipment, boilers and an extensive range of varied machinery likewise are covered.

Steel Corporation's Shipments Rise in December—5,925,873 Tons in Year

FINISHED steel shipments by the United States Steel Corporation amounted to 418,630 tons in December, compared with 366,119 tons in the preceding month and with 600,639 tons in December, 1933. Last month's movement was equivalent to 26.1 per cent of the corporation's rated capacity for producing finished steel products.

In the full year the corporation shipped 5,925,873 tons of steel, compared with 5,805,235 tons in 1933 and with 3,974,062 tons in 1932. Last year's total, which is subject to year-end adjustments, was 30.8 per cent of the corporations finishing capacity as of Dec. 13, 1933.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORPN.

				1933		1934	
Month	1930	1931	1932	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity
January	1,104,168	800,031	426,271	285,138	17.7	331,777	19.8
February	1,141,912	762,522	413,001	275,929	18.5	385,500	26.3
March	1,240,171	907,251	388,579	256,793	15.3	588,209	36.6
April	1,188,456	878,558	395,091	335,321	21.6	643,009	41.5
May	1,203,916	764,178	338,202	455,302	27.1	745,063	44.4
June	984,739	653,104	324,746	603,937	37.4	985,337	61.2
July	946,745	593,900	272,448	701,322	45.1	369,938	23.0
August	947,402	573,372	291,688	668,155	39.8	378,023	23.1
September	867,282	486,928	316,019	575,161	35.6	370,306	23.0
October	784,648	476,032	310,007	572,897	35.5	343,962	20.6
November	676,016	435,697	275,594	430,358	26.7	366,119	22.9
December	579,098	351,211	227,576	600,639	38.7	418,630	26.1
Plus yearly adjustment	(40,259)	(6,040)	(5,160)	(44,283)	...	.....	...
Total for year	11,624,294	7,676,744	3,974,062	5,805,235	30.1	*5,925,873	30.8

*Before yearly adjustment.

Business Editors Study Unemployment Compensation

UNEMPLOYMENT compensation —not "unemployment insurance" —laws both national and State are imminent in 1935. This is pointed out in a report, "Facts About Unemployment Compensation," issued Jan. 1 by the Committee on Social Legislation acting jointly for the National Conference of Business Paper Editors and The Associated Business Papers. It is number one of a series of A.B.P. studies of current national business problems.

The report shows that as early as 1932 this country saw its first actual legislation take effect—the Wisconsin plan compelling employers to contribute two per cent of payroll in order to pay from $5 to $10 per week for ten weeks to employees suffering involuntary unemployment; but that no less than 30 company plans had been working . . . the Dennison Mfg. Co. starting first in 1916.

The report discloses that many state and national studies of the problem have been made; that a wave of legislation has resulted—68 state and three Congressional bills in 1933—culminating last year at Washington in the Wagner-Lewis bill for a 5 per cent payroll tax with deductions for those employers who stabilize employment. The wave is expected to rise even higher this year before Congress and all of the 43 legislatures which will be in session.

After reviewing the major plans such as the "American Plan," the Deane Plan, the Massachusetts Commission proposal, the Rochester Plan, recommendations of the President's Committee on Economic Security last year, various company plans and the experience of Great Britain, the committee declares: "There is little doubt that Congress will quickly adopt some measure which will force, or at least strongly influence, action by the States to establish some definite system of unemployment compensation."

The Committee's study of the mass of proposed legislation notes a trend away from pooled funds toward separate accounts for each contributing employer with each company's liabilities limited to its own reserve. And recent bills would reduce an employer's contributions in proportion to his ability to maintain the continuity of his payroll, thus preventing unemployment.

The editors also note that "in every plan which has received any serious consideration, definite limits are set upon the amount of compensation which may be paid to an unemployed worker and upon the number of payments he may receive." They observe that bill writers would not throw the whole load on employers; employees must help set up their own safeguards; the public must aid casual, seasonal and intermittent workers and regular workers who may have used up their unemployment reserves.

The editors' study of current thinking about unemployment compensation reveals that a good many authorities believe nation-wide adoption of a plan will actually throw more men out of work at first, as employers strive to stabilize employment, but that new processes and new products will reabsorb them into industry later.

The report closes with a list of easily available literature on the various phases of the unemployment compensation problems of today.

Machine Tools Exempted By Ohio Sales Tax

THE Ohio retail sales tax, which is scheduled to become effective Jan. 21, will not apply to machine tools, according to an interpretation of the law prepared for the National Machine Tool Builders' Association by its attorneys, Garfield, Cross, Doust, Baldwin & Vrooman, Cleveland. When machine tools are sold to dealers for resale the attorneys held the sale is not subject to a tax, regardless of whether or not the machines are to be used for manufacturing purposes. If a consumer intends to use the machine for manufacturing another product, the sale is not subject to the tax whether the machine is sold direct by the manufacturer or through a dealer.

While the attorneys' ruling will cover nearly all sales, there may be a few cases in which an official interpretation may be required and which were not touched on. For example, it is not quite clear whether the tax will be imposed on tools sold for use in public schools or for the private workshop of a man who will not use the machines for the manufacture of a product that is to be marketed.

December Trackwork Shipments Higher

SHIPMENTS of trackwork for tee rail track of 60 lb. a yd. and heavier amounted to 2272 tons in December, according to the American Iron and Steel Institute. In the preceding month, shipments amounted to 2065 tons, compared with 2759 tons in December, 1933.

Trackwork shipments in the full year amounted to 49,110 tons, against 30,824 tons in 1933 and 27,278 tons in 1932.

Shipbuilding Aiding British Steel Market—France Takes Russian Order

LONDON, ENGLAND, Jan. 15 (*By Cable*).—Pig iron output is being readily absorbed and demand is improving with numerous export sales.

Semi-finished steel is quiet, but large orders have been booked. Finished steel is active, with shipbuilding requirements higher and better home and export demand for sheets. Railroads are expected to place large orders this week.

The first steel has been produced at Corby works of Stewarts and Lloyds, marking a revival of the basic-Bessemer process in England and the manufacture of steel and tubes direct from native ores.

Tin plate is quiet. Home consumers are well covered and there are some inquiries for export and fair shipments against old contracts.

The Continental iron and steel markets are fairly satisfactory. Steady English demand for semi-finished steel is reported. Good orders are coming from Argentina, Scandinavia, Greece and Egypt. Business with British India is better, owing to price reductions. Far Eastern demand is dull because of English and American competition and proposed increase in freight rates Feb. 1 may be abandoned. The pound sterling conversion rate has been raised from 1.65 to 1.675 in all overseas markets except British India, Ceylon, Japan and Manchuria.

French works have booked a Russian order for 22,000 tons of rolled steel.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hrth.	£5 10s. to £5 15s.
Tin plate, per base box	*18s. 2d. to 18s. 9d.
Steel bars, open-hearth	£7 17½s.
Beams, open-hrth.	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

*To May 1; 18s. 5d. to 19s. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange

Billets, Thomas	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plate, ¼ in. and up	£4
Plate, 3/16 in. and 5 mm	£4 2s. 6d.
Sheets, ⅛ in.	£4 7s. 6d.
Beams, Thomas	£3 2s. 6d.
Angles (Basic)	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

British Iron and Steel Output Rises Sharply

LONDON, Jan. 14 (*By Cable*).—Steel ingot production in Great Britain during 1934 amounted to 8,860,700 gross tons, an increase of 26.5 per cent over the 7,002,800 tons produced in 1933. The improvement in pig iron output was even more pronounced, 1934 production having amounted to 5,978,500 tons, compared with 4,123,600 tons in the preceding year, an increase of 45 per cent.

December steel output was 654,500 tons, compared with 766,000 tons in November and with 668,900 tons in December, 1933. Pig iron output last month totaled 513,500 tons, compared with 507,600 tons in the preceding period and with 409,300 tons in December, 1933.

Monthly production of pig iron and steel ingots in Great Britain during 1933 and 1934 was as follows:

1933	Pig Iron	Steel Ingots
Jan.	286,600	444,400
Feb.	270,800	482,700
March	332,200	577,700
April	324,700	509,600
May	339,900	599,600
June	345,600	568,800
July	343,900	567,500
Aug.	362,700	551,300
Sept.	359,700	669,000
Oct.	373,300	668,300
Nov.	374,900	695,000
Dec.	409,300	668,900
	4,123,600	7,002,800
1934		
Jan.	441,300	711,000
Feb.	414,400	707,500
March	503,600	834,500
April	496,300	716,800
May	527,900	780,000
June	514,900	757,500
July	528,300	719,200
Aug.	503,300	667,000
Sept.	500,300	734,700
Oct.	527,100	812,000
Nov.	507,600	766,000
Dec.	513,500	654,500
Year	5,978,500	8,860,700

Construction Awards Gain in 1934

THE construction industries in the 37 Eastern states ended the year 1934 with a contract total of $1,543,101,300 for all classes of construction, according to F. W. Dodge Corpn. This was a gain of about 23 per cent over the total for 1933, the increase occurring entirely in the sphere of public work.

For the final month of 1934 the contract volume was smaller than in either the previous month or in December, 1933, the total of $92,723,700 having been lower than in any month since July, 1933. The loss from November, 1934, was 17 per cent while the decline from December, 1933, amounted to 55 per cent.

The year 1934 showed contract gains over 1933 in each of the ten general classes of construction, except factories and residential building. The decline in factory construction totaled almost 10 per cent while the loss in residential building was less than 0.5 per cent. An increase of more than 50 per cent was reported in commercial buildings; awards for educational buildings were practically treble those of 1933; hospital and institutional building showed only a slight advance; public buildings increased by about 5 per cent; religious and memorial buildings gained less than 5 per cent; social and recreational buildings increased by something more than 50 per cent; public works of engineering types increased by about 25 per cent; while public utility structures shared in the general advance with a gain of somewhat more than 20 per cent.

New Steel Making Practices Discussed

IN the comparatively brief span of 35 years, steel making in the open-hearth furnace has progressed from the embryonic stage to an industry capable of producing in excess of 60,000,000 tons of high-quality steel annually. This point was brought out by L. F. Reinartz, works manager, American Rolling Mill Co., Middletown, Ohio, who addressed 200 members and guests of the Cleveland chapter, American Society for Metals, on Jan. 7.

Mr. Reinartz, a pioneer steelmaker and chairman of the open-hearth committee of the A.I.M.M.E., related amusing incidents of the early days in steel mills, such as the interment of a frozen ladle of metal because of the lack of equipment to handle it back into the furnace, and the subsequent disinterment of this corpse years later when equipment had been developed to handle it. He explained the important parts played in the drama of steel making by improved refractories, enlarged furnaces, perfection of auxiliary equipment, labor-saving devices and the advent of a higher type of personnel in mill jobs.

Mr. Reinartz described a new type of open-hearth in which all valves have been eliminated by the use of two venturi stacks, each equipped with 100-h.p. motors and fans for forcing air through checkers and the furnace, and extracting waste gases.

THIS WEEK IN WASHINGTON

Divergent views are expressed at Price Control Hearings, but majority favor open price filing plans.

o o o

Steel Labor Board decides against union complainants in Republic's Niles and other cases.

o o o

Engineers assay New Deal in search for benefits at symposium on Outlook for Durable Goods.

o o o

Labor leaders keep monkey wrench in wheels of steel-labor truce movement, in spite of Administration's favor.

o o o

Court decision on steel election cases may precipitate a labor crisis.

o o o

By L. W. MOFFETT

Resident Washington Editor, The Iron Age

o o o

Price Control Hearings Begin

WASHINGTON, Jan. 15.—Strong pleas for retention of open price and waiting period provisions under codes were made by machine tool builders, metal-working and related interests at a hearing on price fixing and price control which began here last week before the National Industrial Recovery Board.

It was the first of a series of open hearings called by the NIRB which look to overhauling of codes. Fear that price protection is doomed for the discard attracted business interests throughout the country to insist vigorously against such action. On the other hand opposition to any form of price protection was roundly emphasized by various speakers. At times the hearings became lively as the two opposing views were presented. They were remindful of, though milder than, the hearings held last year which were called by former Administrator Hugh S. Johnson to get views of general code authorities and the consuming public.

Many Code Authorities Heard

Some 250 code authorities presented their views at the price-fixing and price-control hearing. So intense was the interest that the hearing, held before the National Industrial Recovery Board, brought an attendance that jammed the large auditorium of the Department of Commerce building as it opened last Wednesday.

The views of code authorities generally were strongly in favor of open price filing and waiting period provisions, but they were combated by purchasing agencies, a few manufacturers, and groups of retail lines. The declarations of some of the opponents to such price protection were especially bitter. In instances the codes generally were hotly scored and were charged with most every economic crime imaginable. Supporters of open price filing and waiting periods, however, were equally as vigorous in declaring that such provisions are necessary to prevent disaster in the way of destructive price cutting, wage slashes and general lowering of living standards.

It was made clear by the board, however, that open price filing when properly administered is in accord with its policy. It has indicated, however, a critical attitude toward waiting period provisions and has held that actual price fixing in the usual case is inconsistent with the most effective functioning of the industrial system. In explaining the board's position as he opened the session, Chair-

man S. Clay Williams explained that the board recognizes the value of permissive cost systems, emergency price provisions and the dangers of destructive price cutting. It also recognizes, he stated, that minimum prices may be proper for the normal operations of certain types of industry but in such cases Government supervision and control would naturally tend to be increased.

To Revamp Codes

The board proposes to revamp the codes after the hearings, and without waiting for the completion of the entire series, the next of which will begin Jan. 30 and deal with employment provisions. The general view is that price fixing itself is slated to be stricken from codes except in cases such as pointed out by Mr. Williams. But open price filing, it is believed, will continue to be permitted. There is doubt as to whether waiting periods will be permitted. In any event they promise to be made more restrictive if not entirely prohibited. "Sales below cost" provisions appear to be doomed. Many now are still "on ice" following their "stay" last year under a general order. The opposition to actual price fixing has grown greatly and it is clear that anticipation of action by Congress against it is believed to be partially responsible for calling the hearing on the subject as well as on other code provisions.

Machine Tool Industry's Position

The need for retaining open price and waiting provisions in codes was strongly emphasized by Herman H. Lind, executive officer, supervisory agency, Machine Tool and Forging Industry, Cleveland. The first speaker after preliminary presentations by NRA officials, Mr. Lind drew the distinction between fixed prices and the open price principle. He pointed out that fixed prices are prices arrived at by negotiation and agreement between competitors for purposes of determination of prices at which the various competitors are to sell their goods. The open price principle, Mr. Lind explained, requires that each producer shall establish his own prices for his product, announce them openly, and then quote and sell on that basis without deviation or discrimination among customers.

"Open, published prices have the definite effect of preventing monopolies between competitors because they tend to avoid disastrous cut-throat competition, under which the producer with a strong cash reserve may live while a more efficient new or smaller producer may be driven out," said Mr. Lind, who pointed out that the NRA makes specific provision against fostering monopoly. "However, there is another angle to the fostering of monopolies that in my judgment is of much greater importance, and that is the monopoly that is fostered and promoted by large buyers who, because of ability to exert pressure, are able to obtain lower prices, rebates and other concessions that are not open to their competitors."

Mr. Lind declared that it has long been recognized by business men, by economists, and by the Federal Trade Commission that the firm price policy based upon a published price list from which deviation shall not be made under any circumstance is the only sound policy for doing business and the only policy under which all customers are treated equally and without discrimination. It was stated that much uncertainty and expense is saved through the open, firm policy, and that the need of doing business is increased through eliminating extra sales trips necessary to carry through a trade operation between competitors. The buyer, it was pointed out, can put his entire attention on evaluating the relative merits of the product offered him against the known prices and choose according to his best judgment.

Prevents Misinformation

"The open price provisions under which many codes are operating have brought to light the extent to which misinformation often is given by buyers to competing sellers while trading operations are under way," said Mr. Lind. "The open price policy is the policy under which buyers for the retail trade sell their goods; it is the policy under which they should be willing to buy. In many industries the buyers have represented corporations of such magnitude, controlling so great a proportion of the total demand that they have been able to force their conditions of purchase upon the vendor, thereby obtaining preferred prices and terms. Such a condition effectively throttles free competition between sellers, because the sellers are so dependent upon the larger buyers for business to keep their plants running and their workers employed. Such concentration of purchasing power in large industrial institutions, mail order houses, chain stores, and department stores, in many cases demoralized the suppliers to the point where all profit had gone out of business and salaries and wages were brought below a subsistence level for many thousands of employees."

In upholding the necessity for a waiting period, Mr. Lind pointed out that in an industry such as the machine tool the purchase and sale of equipment for production necessitates a vast amount of engineering that is a matter of cooperation between the technical staffs of the buyer and the seller for the purpose of determining proper tooling and arrangement. It was declared to be a capital investment and therefore usually subject to appropriation procedure. The time, Mr. Lind said, should be short enough so that prices can be adjusted in accordance with costs and should be long enough to take care of the mechanics of exchange and for the protection of customers to permit of normal study in determining a purchase.

Mr. Lind declared that much has been said about the waiting period as a "period of persuasion." The term "period of persuasion," as he understands its use, Mr. Lind said, infers that the waiting period generally is used by competitors to persuade one who has reduced his price to return it to where it was. He said he did not believe that this has been the general practice.

"A careful analysis of price changes filed in our office does not indicate a single instance of a price once changed being withdrawn either during the waiting period of 10 days, which is provided in our code, or soon thereafter," said Mr. Lind. "A close observation of price changes filed with us indicates that price changes that have been made have been based only on sound judgment on the part of the individual machine tool builder, to take care of shifting costs, improved product, improved processes, or changes in market conditions."

It was pointed out if there are indications that the waiting period has been used to bring pressure to bear on sellers who have reduced their prices to have them change them, the abuse could be avoided by a provision that price changes once amended cannot be withdrawn before the expiration of the waiting period except where obvious errors have been made. Another reason given for the necessity of a period for newly reestablished prices to take effect was to prevent discrimination between customers by preventing a quick reduction in price to get a specific order under secret provisions where competition is keen or in a quick rise where the seller may feel he has an inside track.

"If the open, one-price, firm policy has proved itself as a sound practice through its use in the retail trade industries and such other industries who have adopted it, it should be possible to make it practicable in operation in all other industries," Mr. Lind said. "The nearest approach to establishing uniform protection in this respect has been in codes that have provided for price list exchange so that prices are known definitely to all competitors through their source, instead of to buyers, whose statements may or may not be accurate. Only through the open, firm price policy, and the elimination of secret deals, can the balance for mutual protection of buyer and seller be safeguarded."

O'Leary Takes Same Position

Taking the same position as that taken by Mr. Lind, open price filing and waiting period provisions were declared by John W. O'Leary, president, Machinery and Allied Products Institute, to be necessary.

Engineers Survey Methods for Benefitting From New Deal—Durable Goods Outlook

WASHINGTON, Jan. 15.—Application of Deisel power in the American merchant marine as an aid in stimulating the durable goods industries was proposed by R. E. W. Harrison, chief, Machinery Division, Bureau of Foreign and Domestic Commerce, Department of Commerce, at a symposium on "The Outlook for Durable Goods" before the annual meeting of the American Engineering Council at a session here last week. Mr. Harrison also called attention to the possibilities of developing markets for ships' mechanical auxiliaries, and the obsolescence of railroad locomotives and freight cars which need replacement and declared that Federal agencies are using PWA funds to modernize their present plants. He said that this apparent pouring out of funds is good economy when it is observed that some of the machinery in navy yards, for example, is 25 to 30 years old while production efficiency has trebled in this period. In terms of organization he stated that the machinery industry has benefited from the depression. More than 50 trade associations were declared to have fused their interests in the Machinery and Allied Products Institute since the PWA was set up.

Presiding at the group meeting on durable goods was Ralph E. Flanders, president of the American Society of Mechanical Engineers and of the Jones & Lamson Machine Co. Among reports made at the council meeting was one offered by Mr. Flanders which deals with machine limitations in codes. It was turned over to the council with the request that the report be presented at the forthcoming NRA conference on production. It consisted of factual material.

Industry Favors Minimum Wage Provisions

Joining in the discussion on durable goods was William P. Witherow, vice-chairman, NRA Industrial Advisory Board, and formerly president of the Witherow Steel Co., Pittsburgh, now a part of Republic Steel Corpn. Mr. Witherow declared that confusion in the NRA objective had disappeared and that NRA is opposed to restrictive provisions in the codes. The Administration, he pointed out, is positively favorable to the profit system. Industry, Mr. Witherow said, favors minimum wage provisions in codes. He said that by insisting upon price-fixing provisions in codes, some sections of American business are inviting Government supervision. He urged business to get along on a minimum of Federal assistance in order to escape Government management.

Though present NRA "philosophy" is "absolutely against restriction," some quarters of industry were declared to have asked for "all the regimentation they can get."

The meetings were designed to instruct representatives of engineering societies in the future construction needs of emergency Government agencies and in the probable course of the Washington Administration. Present at the meeting were about 60 engineers from national, state and local societies.

One resolution adopted promised continued support of plans to complete a map of the United States being prepared by Federal agencies. Another related to rural electrification and was submitted by Robert McCuen, president, National Society of Agricultural Engineers. He stated that rural electrification planning is extending to Federal agencies and said the Bureau of Engineering of the department should act to gather basic data which have been collected by engineering groups in many sections of the country.

Construction Industry Must Be Aggressive

Col. Donald H. Sawyer, director, Federal Employment Stabilization Office, and former temporary head of the PWA, said that the private construction industry must revive the spirit of salesmanship. The creative idea, he said, still exists among engineers and they are the ones who must develop plans and convince bankers and others of the soundness of projects. Colonel Sawyer added that the construction people must be more aggressive rather than lean on the Government.

At the dinner, Friday evening, Dr. Harold G. Moulton, president, Brookings Institution, outlined economic trends leading to the depression. The guest of honor at the dinner was Gov. Marriner Eccles of the Federal Reserve Board who previously addressed an executive session of the assembly of the council.

In illustrating how farm machinery has shifted the population in the United States, Mr. McCuen pointed out that whereas 100 years ago it took more than three persons on a farm to support one person, now one person on a farm supports four in the city.

The council mapped out a set-up of public affairs committees in the States to cooperate with the legislative interests of a similar group in Washington.

Dealing with many subjects bearing on the durable goods industries and the part the engineer should play in their stimulation, Mr. Harrison declared that if ever there was a time when thoroughly coordinated thought and a united front were called for, now is the time. "The challenge to the engineer," he said, "is one that he must face and accept if he is to retain his place as a leader in the contributions to our social welfare."

Mr. Harrison made a number of constructive suggestions for cooperative action by engineers in approaching and acting upon problems growing out of the economic order. As a prelude he strongly emphasized the need of getting facts, for even the up to date engineering industry has been a major delinquent in providing itself with facts relating to industry.

Listing problems common to the four engineering societies which participated in the sessions, Mr. Harrison included in them the following: Obsolescence; depletion of financial resources; shortage of skilled mechanics and supervisors; the ideal presentation of a case for the installation of improved equipment; possible avenues of coordination within the industry; competition between branches within the industry; our changing manufacturing technique; skilled mechanics or automatic machinery, and a survey of the labor situation within the industry.

Mr. Harrison suggested that discussion be invited on these subjects in all local section meetings of all the engineering societies throughout the United States and that the best thought developed be headed up in the form of papers presented at annual and semi-annual meetings. From these he would have the American Engineering Council make an evaluation and determine a policy.

Code Developments During Past Week

WASHNGTON, Jan. 15.—The code authority for the reinforcing materials fabricating industry has made application to the NIRB for supplementary approval of its budget for code administration, and the proposed basis of contribution to the same by members of the industry.

The budget covering the period from Jan. 1, 1934, to Dec. 31, 1934, was originally approved on Aug. 7, 1934, together with the basis of contribution then provided. It amounted to $61,709.68. The basis of contribution called for an assessment of $3 per $1000 of invoice value in the accounting period as authorized by the code.

GALVANIZED WARE

The supplementary code authority for the galvanized ware manufacturing industry, a division of the fabricated metal products man-

ufacturing and metal finishing and metal coating industry, has made application for approval of its budget for code administration, and the proposed basis of contribution to the same by members of the industry. The total amount of the budget for the period from May 27, 1934, to June 16, 1935, is $13,553.

TACK AND SMALL STAPLE

The supplementary code authority for the cut tack, wire tack and small staple manufacturing industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry, has made application for approval of its budget for code administration, and the proposed basis of contribution to the same by members of the industry. The total amount of the budget for the period from Aug. 1, 1934, to July 31, 1935, is $20,290.

METAL ROOF DECK

On behalf of the Metal Roof Deck Manufacturing Association, C. L. Bostwick, of the United States Gypsum Co., Chicago, at a public hearing formally submitted for NRA approval a proposed appendix to the code for the fabricated metal products manufacturing and metal finishing and metal coating industry.

The proposed appendix is in accordance with provisions of the master code which provides that any trade group may submit separate trade practice rules to which members of the subdivision would be subject, in addition to those prescribed in the basic code.

Among other things, the suggested appendix would provide for an administrative group to consist of one representative for each member of the subdivision who assents to the supplement and agrees to share in the costs of administration expense; require each member to file prices with an impartial agency selected by the governing body; prohibit price discrimination between different purchasers of commodities with the safeguard that subdivisional members are to remain free to select their own customers; forbid unit bids including both the cost of products and labor involved in erection; and allow the acceptance of separate orders for erection of the products.

CODE AUTHORITY MEMBERS APPROVED

The National Industrial Recovery Board has announced recognition of the following as duly elected members of code authorities:

Socket Screw Products Manufacturing Industry—(Division of the fabricated metal products and metal finishing industry)—J. S. Cochran, Mac-it Parts Co., Lancaster, Pa.; W. A. Purtell, Holo-Krome Screw Corpn., Bristol, Conn.; W. J. Finn, Chicago Screw Co., Chicago; R. S. Mast, Standard Pressed Steel Co., Jenkintown, Pa.; and W. A. Wartcki, Brighton Screw Works & Mfg. Co., Cincinnati.

Steam Engine Manufacturing Industry—(Division of the machinery and allied products industry)—W. S. Elliott, Elliott Co., Pittsburgh; A. E. Ballin, Nordberg Mfg. Co., Milwaukee; Albert Bradley, Ames Iron Works, Oswego, N. Y.; I. H. Reynolds, Allis-Chalmers Mfg. Co., Milwaukee; and A. D. Skinner, Skinner Engine Co., Erie, Pa.

Gasoline Pump Manufacturing Industry—L. O. Carlson, Erie Meters Systems, Inc., Erie, Pa.; S. H. Frensdorf, Service Station Equipment Co., Conshohocken, Pa.; W. M. Griffin, Wayne Co., Fort Wayne, Ind.; S. C. Hope, Gilbert & Barker Co., Springfield, Mass.; C. C. Oberly, Tokheim Oil Tank & Pump Co., Fort Wayne, Ind.; R. Eugene Risser, Southwest Pump Co., Bonham, Tex.; and L. E. Rush, Rush Mfg. Co., Lafayette, Ind.

POTOMAC BRIEFS

Hopes for Truce Fade

Published reports to the contrary, there is no evidence that the Administration is going to renew efforts to arrange a truce between the steel industry and organized labor. Greatly disappointed though it is that the White House conference between steel executives and representatives of organized labor did not result in the proposed six months' peace agreement, the Administration apparently feels that nothing further can be done about it.

Nevertheless it is understood that important Government officials feel that the blame lies with organized labor. For it was the official view, it is said, that the steel executives had made agreeable proposals and that arrangement of the truce was simply a matter of formality. But organized labor bucked up and threw a wrench in the machinery.

Secretary of Labor Frances Perkins, who, as is well known, has frequently differed with both the steel industry and the American Federation of Labor, is represented as having been entirely sympathetic with the steel industry's terms for a truce. She has said that "some" felt the industry's offer to recognize the Amalgamated Association of Iron, Steel and Tin Workers as representatives of its members might lead to "a short cut to a desirable end, real collective bargaining." But the association would have none of it.

Labor Cases Headed Toward Supreme Court

Meanwhile Department of Labor attorneys are expected to study suits brought by employee representation groups at the McDonald, Ohio, and Duquesne, Pa., works of the Carnegie Steel Co. against the National Steel Labor Relations Board, which has ordered elections under its supervision at those works. The assumption is that the department wants to form its own views as to the merits of the proceedings. Pro-organized labor that it is, the department desires to keep independent of these important proceedings, which may reach the Supreme Court and mark the first determination of the powers of the National Steel Labor Relations Board to order elections. The board, of course, supported the Amalgamated association view that prior employee elections were sponsored by the companies concerned and were not held within the terms of the act setting up the steel board.

The Weirton Steel Co. case, on which final arguments have begun at Wilmington, Del., grows out of the Department of Justice's contention that the company violated Section 7-a of the recovery act, alleging the company interfered in its workers' elections of collective bargaining representatives. The charge was made by the old National Labor Board and was sharply challenged by the company which insists, with strong employee support in court, that the employee group is representative of the majority of workers. This case clearly is headed for the Supreme Court.

Discrimination Charges Quashed

The Amalgamated association hung up a poor record in connection with its charges of interference and discrimination against steel concerns in connection with discharges, lay-offs and demotions. The steel labor board turned down all charges involving three companies and many workers, except as to employees, and the situation as to the latter is to be threshed out.

One Way to Halt Nationalization

In an unusually good position to speak with authority, William P. Witherow, well known steel manufacturer who is vice-chairman of the NRA Industrial Advisory Board, has told industry it is inviting Government supervision by insisting upon price fixing provisions in codes. This fact was emphasized at the price hearings before the National Industrial Recovery Board. Expressing his views before the American Engineering Council, Mr. Witherow urged business to get along with as little Government assistance as possible as a means of escaping Government management, and pertinently observed that some "quarters of industry have asked for all the regimentation they can get." There can be no doubt of the correctness of Mr. Witherow's timely points. And whatever criticism may be made of the disturbing trend toward socialization of industry, fairness compels the thought that industry itself has inadvertently brought much of it upon itself.

Extension of Federal Control Over Coal Industry

Accentuation of Government control over industry, a control which might well be challenged in court, is indicated by an NRA approval of an amendment to the bituminous coal industry code providing that coal for future delivery may not be sold at less than code prices.

Steel Labor Crisis Feared When Courts Decide Election Cases

EMPLOYEE representatives of the South Chicago, Ill., and East Chicago, Ind., works of the Youngstown Sheet & Tube Co. have filed petitions with the United States Circuit Court of Appeals at Chicago asking that the decision of the steel labor board ordering elections at those plants be set aside. Similar action will be taken by the employee representatives at the Gary, Ind., works of the Illinois Steel Co. The court has accepted the petitions filed by the Youngstown Sheet & Tube Co. employees and has asked the steel labor board for a transcript of its proceedings for review.

The Chicago action follows the filing of similar petitions in the United States Circuit Courts at Philadelphia and Cincinnati by employee groups at the Duquesne, Pa., and McDonald, Ohio, plants of the Carnegie Steel Co.

It is believed that 60 days will elapse before the circuit courts will reach decisions on these petitions. Meanwhile there will probably be an intensification of proselyting activities of the American Federation of Labor. It is significant that the organizing program in the iron and steel industry authorized at the San Francisco convention of the A. F. of L. has not yet gotten under way. Arthur O. Wharton, head of the Machinists Union, was made chairman of the organizing committee, while John L. Lewis, of the United Mine Workers, was selected as one of the members.

It is believed that the organizing campaign will be timed so that it will reach a climax when the circuit courts reach their decisions, thereby putting the labor forces in readiness for a strike if developments point to the expediency of such a move.

Much depends on the action of the courts and still more on the degree of success achieved by labor leaders in whipping up the emotions of the rank and file of workers.

At the present time there is little question that the great majority of iron and steel workers want work more than anything else. Recent increases in operations have swelled their pay envelopes and in many cases have inspired hopes of a return to the steady income that they enjoyed in the twenties. Recently certain employee representative groups have asked for a 15 per cent increase in wage rates, but when reminded that their companies are still operating at a loss have seen the futility of such a demand. They are beginning to realize that steady work rather than a higher wage rate is the key to greater income. Steel companies have been unable to operate at a profit at present wage costs and further price advances might stifle demand, thereby reducing the amount of work available and hence the weekly incomes of the worker.

Leaders, whether in so-called company unions or in outside unions, are tempted to make promises to their constituents. Like all political leaders, they feel that they will be judged by what they can get for those whom they represent. It is questionable, however, whether sweeping promises will impress the average worker on April 1 if his pay envelope is large and he has the prospects of steady work through the ensuing months. The strategy of organized labor leaders is to strike when industry can least afford a shutdown. But it is possible that they overlook the fact that such a time is one when the worker will be least disposed to give up his pay.

Of a piece with demands for higher rates of pay are requests, recently made by various employee groups, for vacations with pay. At least one steel company has granted vacations with pay, but it, unlike a number of other companies, has no pension system. With pension costs and the possibility of unemployment insurance costs being added, companies which have been operating at a loss see no present possibility of increasing their outgo. Moreover, talk of vacations still seems rather premature in an industry in which part-time work and rotating shifts have been the rule for several years.

Employee representatives, far from being docile, are proving most articulate. Though some of their demands may be ill-advised, they are not made in an unreasoning or hostile spirit and generally lead to a rectification of misapprehensions and to a fuller understanding of the common problems of men and management. The respect with which companies have come to regard the so-called company unions has sharply reduced their fears of a successful organizing campaign by the national unions. But for the fact that the elections ordered by the steel labor board would set a precedent and encourage demands for an endless succession of elections at other plants, thereby keeping the industry in constant turmoil, tests of strength would be welcomed. It is the chronic agitation that is disturbing. If A. F. of L. maneuvers actually result in the calling of a nation-wide strike April 1, it will at least offer the advantage of providing a single, simultaneous test of strength. But for the fact that a strike would be a blow to business recovery, the industry would probably embrace it gladly as a decisive test which would settle the unionization issue once and for all.

Republic Cases Thrown Out

WASHINGTON, Jan. 15.—Passing upon complaints of members of the Amalgamated Association of Iron, Steel and Tin Workers at the Niles and Warren, Ohio, plants of the Republic Steel Corpn., the National Steel Labor Relations Board found that charges of alleged discrimination were not sustained as to the Niles plant but upheld similar charges in the case of two employees at the Warren plant.

In the Niles case, the board recommended that an opportunity be given to three complainants, Charles Mahoney, Chester Randall and Hugh Tompkins for medical examination within 15 days from the date of the order and that they be reinstated if in proper physical condition. It was also recommended "as an act of good faith" that, although no discrimination for union activities was found, that a Mr. Hillman, a car bracer, be reinstated in his former position "because of the fact that the reasons for which he was laid off do not appear from the evidence to have been adequate."

In the Warren case, while no discrimination because of union activities was found with respect to eight men, the charges were held to have been sustained regarding Walter Bangaskey and Isaac Price. The board said that unless the company notifies the board within 10 days that it has reinstated these two men it will refer the case to the Compliance Division of the National Industrial Recovery Board upon application from either or both of the employees.

J. & L. Exonerated

The board also handed down a decision last Saturday exonerating the Jones & Laughlin Steel Corpn. of charges brought by Beaver Lodge No. 200 of the amalgamated association that the company had interfered with the self-organization of its employees for the purpose of collective bargaining and the election of representatives at its Aliquippa, Pa., plant. The board said the charges had not been sustained.

It was declared that special police of the company in the early stages of the organization of the lodge, formed Aug. 1, 1934, had engaged in espionage but that it was stopped when called to the attention of mill officials. The board likewise said that during the initial period of organization of the lodge members of the lodge engaged in coercion and intimidation against other employees, but that such occurrences have ceased. It was stated that both the company and the association admit that a peaceful situation now exists at the mill and that a petition of the association for an election was deferred by stipula-

tion and is now at issue. It was also stated that Joe Latone, a member of Beaver lodge, alleged to have been discharged for union activities, has been reemployed and the complaint as to him has been settled.

RFC to Make Plant Modernization Loans

WASHINGTON, Jan. 15. — Designed to assist in the stimulation of demand for capital goods, a regulation put into effect by the Reconstruction Finance Corpn. provides for the consideration of loan applications where the money is to be used principally for the replacement and modernization of plant and equipment. The regulation is similar to one which THE IRON AGE has previously stated was under consideration. Its adoption gives further emphasis to increasing efforts being made by the Administration to aid the capital goods industries. While Administration officials have on several occasions indicated their belief that the outlook for the heavy industries was not bright and would not be for several years, a move to convince it to the contrary apparently is making headway and likewise its significance as a recovery step, the largest single factor among employment possibilities, has been strongly emphasized.

The new and liberalized loan regulation calls for consideration by RFC of loans the proceeds of which are to be used principally for the purchase of additional machinery, provided that the loans are adequately secured, that an economic need is shown for the installation of new machinery and that such installation would not substantially increase the productive capacity of the plant; that satisfactory evidence is submitted that not less than one half of the loan could be amortized from earnings during a period of five years; that the applicant shows that it has sufficient current operating assets to meet its normal requirements.

Another new regulation provides that consideration for industrial loans will be given to applications where a "substantial" rather than "incidental" portion of the proceeds is to be used to satisfy or compromise existing indebtedness. These loans will be based upon the following provisions: That it is shown that the loan is necessary to increase or maintain the employment of labor; that the loan is adequately secured; that the applicant, after the debt adjustment, will have sufficient operating assets and a good chance of continuous operation.

Plans are already under way in Congress to extend the life of the RFC two years, with the right of the President to declare a proclamation ending it in the meantime. Unless extended, the RFC would come to an end Jan. 31, this year.

PERSONALS

ROBERT GREGG, since October, 1933, president of the Tennessee Coal, Iron & Railroad Co., has been elected vice-president in charge of sales of the United States Steel Corpn., effective Feb. 1, succeeding CHARLES L. WOOD, who has retired on account of ill health. Mr. Gregg is 50 years of age and a native of Atlanta, Ga. He received his schooling at the Atlanta public schools and Georgia School of Technology, and was graduated from Cornell University. He began his business career in August, 1907, with the Atlanta Steel Co., continuing with that company and its successor, the Atlantic Steel Co., until Aug. 1, 1932, when he resigned to become vice-president of the Tennessee Coal, Iron & Railroad Co. He was promoted to the presidency in October, 1933. During his extended connection with the Atlantic Steel Co. and later with the Tennessee company he had experience in virtually all branches of the steel business.

JOHN L. PERRY, vice-president of the American Steel & Wire Co., has been recommended by the finance committee of the Steel Corporation for election as president of the Tennessee company. He was born in Worcester, Mass., 54 years ago. His entire business career has been with the American Steel & Wire Co., having entered the service at its Worcester plant in 1899. He has held various positions, including that of manager of the Worcester district of that company. On Jan. 1, 1933, he was promoted to the vice-presidency of that company in charge of operations.

ROBERT GREGG

J. L. PERRY

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A. B. JACOBUS, for the past several years manager of general scale sales in the Chicago office of Fairbanks, Morse & Co., has been made general manager of E. & T. Fairbanks & Co., St. Johnsbury, Vt., a subsidiary. GEORGE C. WORTHLEY, formerly manager of the scale department in the New York branch, has been transferred to Chicago to take the place of Mr. Jacobus.

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S. R. COX, JR., formerly sales engineer for the Hyatt Roller Bearing Co. and prior to that connection identified with the Carnegie Steel Co., has been appointed Pittsburgh district manager for the Morgan Engineering Co., with headquarters in the Oliver Building. J. J. MCQUILLEN, heretofore Pittsburgh district manager and for 45 years in the employ of the Morgan company, has been granted a leave of absence, and it is probable that later he will be in the home office of the company.

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GEORGE A. MEYER has been made production manager and purchasing agent of Advance Pressure Castings, Inc., Brooklyn, N. Y. J. R. SCHUCHARDT has been appointed sales engineer in the metropolitan district of New York.

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CHARLES R. SHERMAN, since early in 1933 identified with the International Printing Ink Corpn., and before that vice-president and general sales manager of R. M. Hollingshead Co., Camden, N. J., has been appointed vice-president of the Ault & Wiborg Corpn., New York, manufacturer of industrial finishes.

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COL. E. A. DEEDS, chairman of the board of the National Cash Register Co., has been elected a director of the American Rolling Mill Co., Middletown, Ohio.

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HARRY L. BARR, heretofore identified with the Newton Steel Co. and formerly with Follansbee Brothers

Co., has been placed in charge of electrical sheet sales by the Granite City Steel Co., Granite City, Ill.

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C. D. STEWART, who has been continuously associated with the Westinghouse Air Brake Co. since 1910, has been appointed chief engineer. He entered the employ of the company as a machinist apprentice and resigned to enter Pennsylvania State College. After receiving his mechanical engineering degree, he returned to the Westinghouse company as a special engineer. He was sent to the San Francisco office as a mechanical expert in 1913 and three years later took on the additional duty of shop superintendent of the Pacific Coast Brake Co., a subsidiary. In 1917 he was promoted to district engineer and in 1925 vice-president, director and manager of the subsidiary.

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W. E. REEBEL, who for the past 21 years has been associated in the engineer roll and mill department of Mesta Machine Co., Pittsburgh, resigned on Jan. 1.

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DONALD S. SAMMIS has been made superintendent of the Underwood-Elliott-Fisher Co., Bridgeport, Conn., plant.

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ROBERT R. HAZLETT has been elected a director of the Wheeling Steel Corpn., Wheeling, W. Va., to fill the vacancy caused by the recent death of Howard Hazlett.

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MILTON L. GEARING, manager of the Meriden, Conn., division of the New Departure Mfg. Co., has been made president of the Manufacturers Association of Meriden.

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JOHN B. CARSE, since 1903 connected with the United States Steel Corpn. as chairman of the purchasing agents' committee and director of purchases, will retire on Feb. 1, under the Corporation's pension plan. He is a native of Indiana and is a graduate of Williams College. Between 1886 and 1903 he was connected with various machinery and engineering organizations in Chicago, for part of the time with the Thomas Kane & Co.

CHARLES H. RHODES, whose entire business career has been with the subsidiary companies of the Steel Corporation, has been made director of purchases. He entered the service of the American Steel & Wire Co. at Pittsburgh in 1899 and rose to the post of purchasing agent for the Pittsburgh district. In 1917 Mr. Rhodes became purchasing agent of the Illinois Steel Co. and its affiliated companies and retired temporarily in 1929 to devote his attention to his private interests. He returned to the Illinois Steel Co. in 1933, in the commercial department.

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GEORGE FITZPATRICK, of Addison Clarke & Brother, has been elected president of the Baltimore chapter of the American Steel Warehouse Association. Other officers elected are: J. S. MCKENZIE, of John McKenzie & Co., Inc., vice-president, and EUGENE MOWLDS, of Scully Steel Products Co., secretary.

JOSEPH B. MONTGOMERY, formerly general manager of sales for Youngstown Pressed Steel Co., has been appointed general manager of the company's entire plant. M. C. SUMMERS has been made assistant general manager and office manager.

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JOHN P. KELLY, retired inspector and senior engineer of the Interstate Commerce Commission, has been added to the consulting engineering staff of the Westinghouse Air Brake Co.

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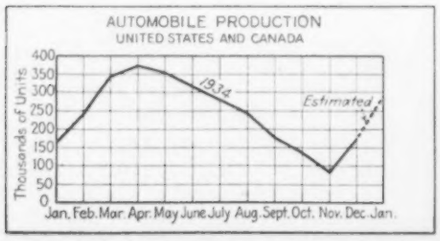
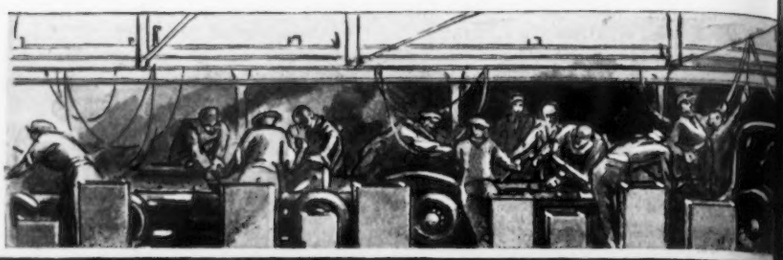
GEORGE E. OSBORN, who for several years has represented the Lamson & Sessions Co., Cleveland, in Iowa and the Missouri River territory, has been appointed vice-president and general manager, at Chicago, of the Lamson and Sessions Co., western subsidiary of the Lamson & Sessions Co., Cleveland. He fills the vacancy caused by the death of A. J. Boyle. Mr. Osborn was born in Cleveland and attended Oberlin College from 1910 to 1913. He entered the employ of the Lamson & Sessions Co. in a clerical capacity in 1914, serving in various positions until 1918, when he enlisted in the Navy. He returned to the Lamson company in 1920 in a sales capacity. GEORGE S. CASE, JR., who has been identified with the operating and sales departments of the company since his graduation from the Tuck School of Business Administration at Dartmouth in 1930, has been appointed assistant general manager at Chicago. Mr. Case was graduated from the University School of Cleveland in 1925.

Steel Men Honor Charles M. Schwab at His Retirement From Chairmanship of American Iron and Steel Institute

BACK ROW: (Left to Right), Charles L. Wood, former vice-president, United States Steel Corpn.; Homer D. Williams, president, Pittsburgh Steel Co.; L. E. Geohegan, vice-president and general manager, Gulf States Steel Co.; Frank Purnell, president, Youngstown Sheet & Tube Co.; Harold L. Hughes, assistant to president, United States Steel Corpn.; Samuel E. Hackett, president, Jones & Laughlin Steel Corpn.; Henry G. Dalton, chairman, Youngstown Sheet & Tube Co.; E. J. Kulas, president, Otis Steel Co.; Donald B. Gillies, president, Corrigan, McKinney Steel Co.; Ernest T. Weir, chairman, National Steel Corpn.; Frederick J. Griffiths, president, Timken Steel & Tube Co.; E. R. Crawford, president, McKeesport Tin Plate Co.; Frederick B. Hufnagel, president, Crucible Steel Co. of America; Henry A. Roemer, president, Sharon Steel Hoop Co.; E. L. Parker, president, Columbia Steel & Shafting Co.; L. F. Rains, president, A. M. Byers Co.; C. D. Caldwell, president, Interlake Iron Corpn.; Frank R. Frost, president, Superior Steel Corpn.

FRONT ROW: (Left to Right), W. J. Filbert, chairman finance committee, United States Steel Corpn.; T. M. Girdler, chairman and president, Republic Steel Corpn.; W. A. Irvin, president, United States Steel Corpn.; George M. Verity, chairman, American Rolling Mill Co.; Charles M. Schwab, chairman, Bethlehem Steel Corpn.; E. G. Grace, president, Bethlehem Steel Corpn.; L. E. Block, chairman, Inland Steel Co.





THIS WEEK ON THE

Tentative Automobile Schedules for February Are Near 400,000 Units

DETROIT, Jan. 15.

DETROIT continues to furnish the country with the spectacle of an industrial revival unparalleled for this time of year since the lush days of the late twenties. The burst of speed shown by the motor car industry in swinging into operations on 1935 models has left suppliers breathless. Two months ago mills were frantically phoning their Detroit offices to get some business to keep the wheels turning. Today local offices are phoning mills in a desperate effort to secure within a reasonable time that extra tonnage which the automotive steel user swears he must have.

Seldom do automobile companies turn out enough cars at or near the year-end to issue optimistic statements giving exact figures. Yet here is Ford admitting that it already has produced 50,002 of its 1935 units and is employing 70,767 workers in the Detroit district. President D. S. Eddins of Plymouth steps forth with the statement that 43,000 cars have been shipped to dealers. Walter P. Chrysler confesses publicly that his corporation made 57,305 cars in December, compared with 6301 units in the same month a year ago.

Sensing that people are hungry for new cars, dealers throughout the country are placing orders in much greater volume than in several years. In the case of Ford, orders have been pouring in by telephone, telegraph and mail; many dealers already have asked for as many cars as they did in nine and ten months of 1934. The demand from the rural sections of the South and West has been beyond expectations, thus auguring well for the revival of farm buying. One maker, with three lines of cars in the less-than-$1,000 market, is swamped with bookings, even though no solicitation has been made on the lowest-price series. Dealers are wiring to factories to increase commitments already made.

February Output to Be High

If the industry's temperature has risen because of feverish efforts to furnish cars to dealers as quickly as possible, it is likely to go even higher next month. Revised schedules of most automobile makers total well over 300,000 units for January, but it will be another week or longer before it will be known how close production departments will come to this mark. It appears reasonably certain, however, that assemblies will be at least 275,000 units. For February, tentative schedules have been revised upward. Ford is hopeful of stretching activities up to 6000 units a day. Unless Ford extends the work-week beyond the usual five days, there will be only 20 working days next month, which may yield an output of 120,000 units.

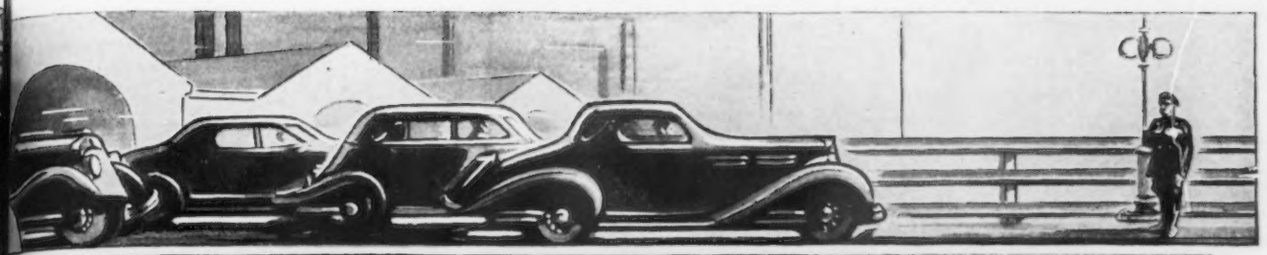
It is hinted strongly that Ford would like to make 140,000 cars in February and a still greater number in March—even as many as 180,000—but to the more conservative observers such figures sound improbable of attainment. Chrysler is in the mood to make 100,000 cars next month, if it is humanly possible to squeeze out that total with its present plant facilities. General Motors has its eyes on a 150,000 mark in February, of which Chevrolet will build 115,000 units. Altogether, the industry is aiming at a February production of around 400,000 units. Aside from 1929, when output was 497,705 units, February heretofore has not bettered the record of 1930, when 345,961 units came off the assembly lines.

In case the present dizzy program is carried out, the peak production month seems likely to be no later than April, unless sales should spurt to unanticipated heights. Fortunately, most of the industry's executives have kept their heads thus far and only a few have allowed the avalanche of orders to make them feel that 1935 is to be a four-million-car year. In 1934 the peak came in April; the same was true in 1929, 1930 and 1931.

Will 1935 Parallel 1930?

Since the industry's production for this year is variously estimated at 3,300,000 to 3,500,000 units, it perhaps is well to look at what happened in 1930, when assemblies were 3,510,178 units. January production in that year rose to 283,610 units (near the amount expected this month). During February 345,961 cars were made. In each of the following three months—March, April and May—output was well over 400,000 units, the peak occurring in April. In June assemblies fell to 349,596 units. They continued to decline gradually to 228,606 units by September. During the final quarter the monthly average hovered near 150,000 units.

Chevrolet sprang a surprise, but gave its competitors something to crow about, when it made knee action optional on its Master cars at $20 extra. It will be recalled that Plymouth and Dodge dropped independent springing, claiming that few buyers were interested in it. Chevrolet suggested that the reason for this action was the desire to achieve manufacturing economies. Now Chevrolet comes along with an eleventh-hour decision to put its own



ASSEMBLY LINE

By BURNHAM FINNEY

Detroit Editor, The Iron Age

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knee action in the optional class. A Chevrolet official suggests that 90 per cent of the Master cars will be sold with knee action, but scarcely ever in the past has such a large percentage of customers chosen to pay extra for equipment designated as optional.

There are said to be two reasons why Chevrolet could not boost its list prices $20 to take care of the added expense of producing knee action units: first, the competitive situation would not permit such an advance, and secondly, a higher price would have been too close to the price of the new Pontiac Standard Six. As a matter of fact, it is understood that Chevrolet will make more money on its cars without knee action than on those with it, because it costs more than $20 to manufacture a knee action unit. While independent wheel suspension has gained ground outside the low-price field, having been adopted this year by Studebaker and by Packard for its 120 model, it appears destined to pass the way of free wheeling unless a design is developed which can be built economically enough that it can be put on a low-price car. At least part of the riding comfort achieved by means of knee action is attained in 1935 models by means of relocation of the seats between the front and rear axles.

General Motors Blankets Field

How completely General Motors has blanketed the field under $1,000 perhaps is not realized until one sees all its lines and their prices. The lowest price car of most manufacturers is a standard coupe. The coupe prices of General Motors cars at the factory are as follows:

Chevrolet Standard	$475
Chevrolet Master	560
Pontiac Standard Six	615
Pontiac De Luxe Six	675
Oldsmobile Six	675
Pontiac Straight Eight	730
Buick 40	795
Oldsmobile Eight	860

One of the most noticeable features of 1935 cars is the increased use of artillery type pressed steel wheels. Several manufacturers, like Hudson, have not only made these wheels standard equipment, but also stated that no other kind of wheel is available. Ford, of course, is still committed to wire wheels. Pressed steel wheels have made especially big gains in Chrysler circles.

Ford Buys Equipment

Ford has enlivened the first half of January for the equipment trade by placing the final batch of orders in the buying program which began about two months ago. Prospects for the next 30 days for machine tool purchases in the automotive industry are not too bright. If production continues to expand as it has in the last month, one wonders how long some companies can go along without buying further modern equipment to speed up operations and likewise lower costs. Certain General Motors divisions are said to be quietly surveying their needs for the purpose of plugging up weak spots in the line when the management gives the word to make more capital expenditures. Two General Motors divisions, one of which is in Detroit, are in the preliminary stages of programs which are likely to lead to equipment buying in the next 60 days.

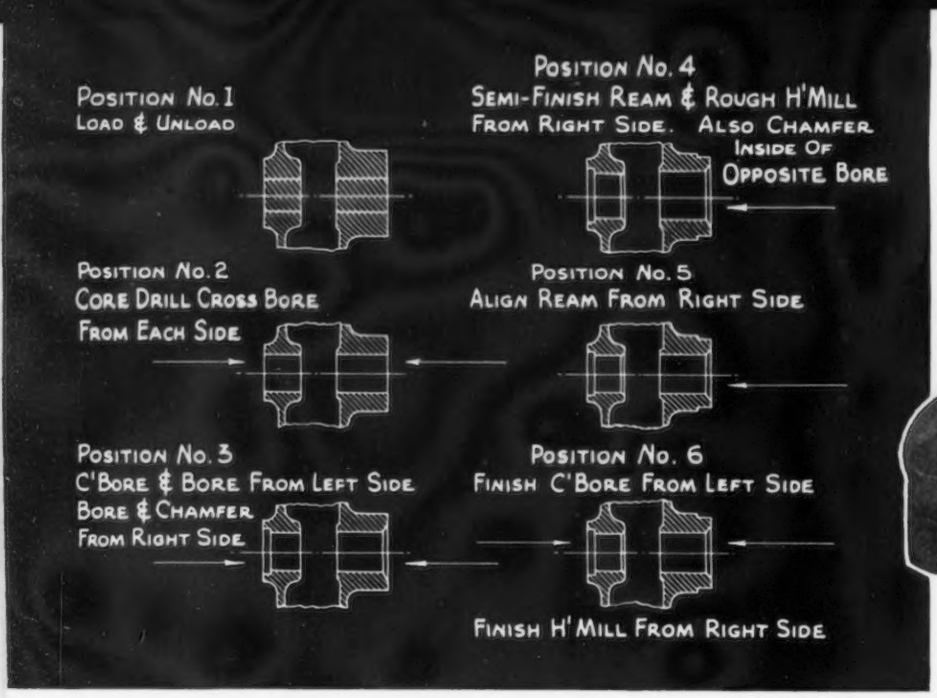
Chrysler divisions are reported sitting tight, with strict orders not to invest in new equipment at the moment. This doesn't mean, however, that Chrysler will not be in the machine tool market this year. The general feeling seems to be that it will go along with its present set-up until June or July and then spend substantial sums for equipment for an early start on 1936 models. Admittedly this is entirely in the speculative realm, but is indicative of how some observers have sized up the Chrysler situation.

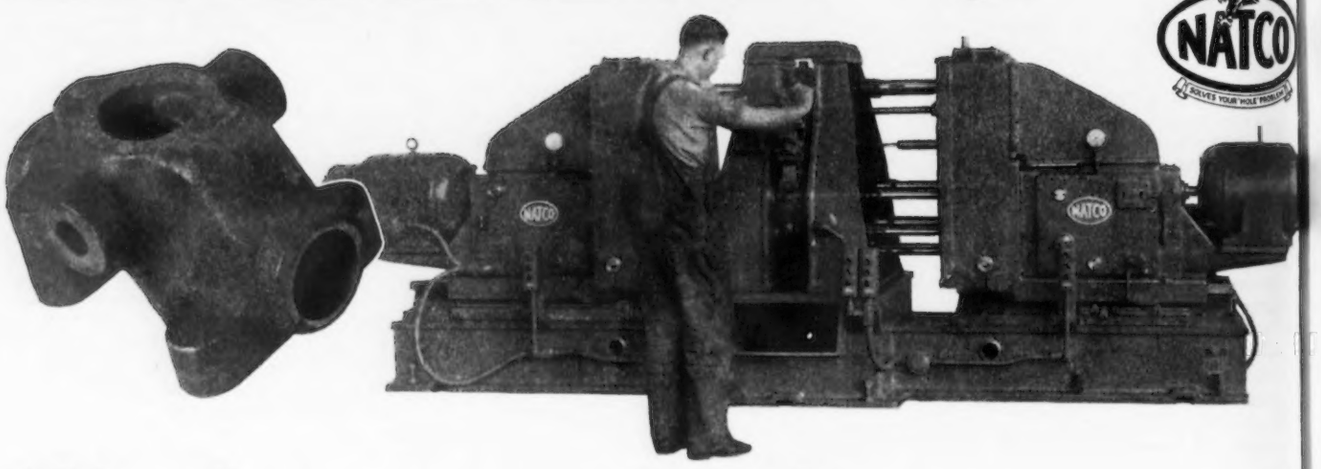
Tariffs, quotas and other restrictive legislation relating to imports have led automobile makers lately to increase the "domestic content" of cars made in foreign countries. Ford, for example, is in the process of increasing the percentage of parts of its Canadian V-eights which are built in Canada. In England the V-eight motor will be made at the Dagenham plant, whereas previously it has been shipped from Ford of Canada. Chrysler has recently moved from American to Canadian plants a considerable amount of machinery used in the fabrication and processing of parts for Chrysler's Canadian cars. While Ford's purchases of equipment in this country for its plants at Dagenham and Cologne and for the Mathis plant in France have been sizable, only about 10 per cent of the machinery needed in the expansion abroad has been bought in the United States. Wherever possible, orders have been placed in the country in which the plant is located.

Code Likely to Be Renewed Without Hearing

Packard will start production this week, but does not expect to attain full operations until about March 1. Hudson states that it shipped 8000 cars in December and will turn out 10,000 cars this month. By the end of January Pontiac will have assembled 18,000 of its 1935 cars. Truck output this month will be large, with Ford alone counting on the manufacture of approximately 28,000 units, thereby exceeding its December truck production.

It is believed even in labor circles that the automobile code will be renewed on Feb. 3 without a public hearing, which has been demanded by the American Federation of Labor. It is possible that a few changes may be made in the code as a result of the recent investigation by the Commission on Stabilization of Production, which shortly will make its report to President Roosevelt, but the code probably will not be reopened for public examination.





Various operations

of core drilling, counterboring, chamfering, hollow milling and reaming are performed on these shock absorber bodies **at a rate of over 300 per hour**

ABOVE are shown two shock absorber bodies and a NATCO two-way machine which performs the various operations (shown in the sketch above) on over 300 castings per hour.

This NATCO machine is built of a single piece welded steel bed, two NATCO Self-contained hydraulic units equipped with boxes containing a total of 18 spindles and a six position (one loading and unloading, and five working) hand indexed trunnion type fixture arranged to hold 2 parts in each position. Although this machine is performing a particular set of operations it can easily be changed and rearranged with little cost should changes occur . . . as it is built of NATCO Self-contained Hydraulic Units which are FLEXIBLE and INTERCHANGEABLE. They are the result of many years of building drilling and boring equipment for all types of industry. Their possibilities are great . . . Among the many combinations is a machine which will do your work for less cost.

Send in your prints and our engineers will gladly submit their recommendations.

NATCO
SERVES YOUR HOLE PROBLEM

CHICAGO SALES OFFICE . . . 1908 Engineering Building
DETROIT SALES OFFICE . . . . . 409 New Center Building

The National Automatic Tool Company
RICHMOND, INDIANA, U. S. A.

SUMMARY OF THIS WEEK'S BUSINESS

Steel Production Advanced to 49 Per Cent of Capacity

Ingot Output Rises Four and One-Half Points to Highest Level Since Last June—Motor Car Output Continues to Mount

STEEL production has again increased, ingot output rising from 44½ to 49 per cent of capacity. This rate is the highest since the third week of June, 1934, and continues an almost uninterrupted upward trend which began in September.

Pressure from the automobile industry for steel has intensified and deliveries on a number of finished products are lengthening, some makers of cold-finished sheets being booked solid for four weeks or more. The container industry also is taking more steel, lifting tin plate production from 45 to 60 per cent of capacity. Other expanding outlets for iron and steel are farm implement and tractor manufacturers, sanitary ware makers, refrigerator plants and metal furniture companies.

THE current rise in iron and steel output is especially encouraging because it reflects a genuine increase in consumption and has not been caused by artificial influences such as brought about the bulges in output in the second quarter of 1934 and during the summer of 1933. While buyers are undoubtedly watching the labor situation, the strike danger is still too remote to encourage anticipatory buying. All present evidences point to the prompt fabrication and conversion of iron and steel upon delivery; there are as yet no signs of inventory inflation.

Automobile makers are being pushed hard for cars, receiving orders by telephone, telegraph and mail. Demand from the rural sections of the South and West is particularly active. Revised production schedules for January call for well over 300,000 units, with a reasonable certainty that assemblies will at least reach 275,000. For February the industry plans an output of 400,000 cars, which will be the highest total for that month since 1929, when 497,705 units were turned out.

RAILROAD rail programs are materializing slowly. The Norfolk & Western is expected to close this week for 32,000 tons of rails, and has already bought part of the required track accessories. The Southern Pacific has entered the market for 26,000 tons of rails, while the Louisville & Nashville contemplates buying 25,000 to 30,000 tons. The St. Louis-San Francisco is considering the purchase of 13,000 tons and the New York Central may buy 20,000 tons.

Structural steel awards of 9750 tons compare with 28,200 tons a week ago. New projects aggregate 19,700 tons as against 25,950 tons in the previous week. Steel purchases for a Government project, the Tygart River dam, Grafton, W. Va., total 5200 tons and cover concrete bars, structural steel sheet piling and steel pipe.

Export demand is expanding. A tin plate producer has booked substantial orders for Far Eastern delivery. The Amtorg Trading Corpn. is inquiring for 500 tons of cold-rolled strip. Imports of wire products are making themselves felt along our entire seaboard and for some distance inland.

CONTINUED strength in scrap prices at most consuming centers has encouraged steel plants to bring in additional blast furnaces and has prompted foundries to use a larger proportion of pig iron in their mixtures. At Chicago, however, where one steel company is lighting two stacks, prices of heavy melting scrap have suffered a sharp setback. THE IRON AGE composite price for scrap is therefore unchanged this week, despite advances at Pittsburgh and Philadelphia.

Stimulation of new capital issues, as well as refunding operations, by durable goods industries is looked for by the Administration as a sequel of the simplification of registration regulations just announced by the Securities and Exchange Commission. The same end is expected to be promoted by the announced willingness of the Reconstruction Finance Corpn. to consider industrial loans for replacement and modernization of plant and equipment.

STEEL output has risen five points to 32 per cent at Pittsburgh, seven points to 57 per cent at Chicago, one point to 29 per cent in the Philadelphia district, four points to 60 per cent in the Valleys, two points to 43 per cent at Buffalo and 10 points to 76 per cent at Detroit. Operations are unchanged at 90 per cent in the Wheeling district, 69 per cent at Cleveland and 29 per cent in the South.

THE IRON AGE composite prices are unchanged at $17.90 a ton for pig iron and 2.124c. a lb. for finished steel. Base prices for cold-rolled sheets may be revised for the second quarter to include extras for drawing. A revision of steel code regulations No. 9, dealing with fabrication-in-transit privileges, is under consideration.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Jan. 15, 1935	Jan. 8, 1935	Dec. 18, 1934	Jan. 16, 1934
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$19.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	18.13
No. 2, Birmingham†	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.	19.76	19.76	19.76	18.76
Basic, Valley furnace	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	19.76
Malleable, Chicago*	18.50	18.50	18.50	17.50
Malleable, Valley	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.54
Ferromanganese, scab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	26.00
Slabs, Pittsburgh	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.75
Bars, Chicago	1.85	1.85	1.85	1.80
Bars, Cleveland	1.85	1.85	1.85	1.80
Bars, New York	2.13	2.13	2.13	2.08
Plates, Pittsburgh	1.80	1.80	1.80	1.70
Plates, Chicago	1.85	1.85	1.85	1.75
Plates, New York	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.70
Structural shapes, Chicago	1.85	1.85	1.85	1.75
Structural shapes, New York	2.05¼	2.05¼	2.05¼	1.95¼
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.40

Finished Steel

	Jan. 15, 1935	Jan. 8, 1935	Dec. 18, 1934	Jan. 16, 1934
Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh	2.60	2.60	2.60	2.35
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.40
Plain wire, Pittsburgh	2.30	2.30	2.30	2.20
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.25
Barbed wire, galv., P'gh	3.00	3.00	3.00	2.85
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.90
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.50	$13.25	$13.25	$13.25
Heavy melting steel, Phila	11.75	11.00	10.75	11.75
Heavy melting steel, Ch'go	11.75	12.75	10.75	10.50
Carwheels, Chicago	12.00	12.00	11.50	11.00
Carwheels, Philadelphia	10.75	10.75	10.75	11.75
No. 1 cast, Pittsburgh	12.75	12.75	12.75	11.75
No. 1 cast, Philadelphia	11.00	11.00	11.00	12.50
No. 1 cast, Ch'go (net ton)	11.00	10.75	10.00	9.50
No. 1 RR. wrot., Phila	11.25	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net)	11.00	11.00	9.75	9.00

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$3.50
Foundry coke, prompt	4.60	4.60	4.60	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.75	7.75
Lake copper, New York‡	9.12½	9.12½	9.12½	8.00
Tin (Straits), New York	50.55	50.87½	50.95	52.37½
Zinc, East St. Louis	3.75	3.75	3.75	4.25
Zinc, New York	4.10	4.10	4.10	4.60
Lead, St. Louis	3.55	3.55	3.55	3.90
Lead, New York	3.70	3.70	3.70	4.00
Antimony (Asiatic), N. Y.	14.50	13.87½	13.75	7.20

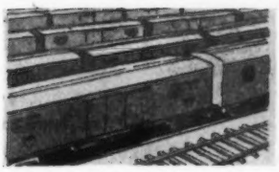
On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Jan. 15, 1935	2.124c. a Lb.	$17.90 a Gross Ton	$12.33 a Gross Ton
One week ago	2.124c.	17.90	12.33
One month ago	2.124c.	17.90	11.58
One year ago	2.008c.	16.90	11.83
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1934	2.199c., April 24	2.008c., Jan. 2	$17.90, May 1	$16.90, Jan. 27	$13.00, Mar. 13	$9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Operations in Sharpest Gain Since Last April



Ingot Output Up Five Points to 32 Per Cent—Valley Rate Rises Four Points to 60 Per Cent; Wheeling Average Holds at 90

PITTSBURGH, Jan. 15.—Steel ingot production in the Pittsburgh district has risen five points to 32 per cent of capacity, the highest level in more than six months, and the sharpest advance since the week of April 16, 1934. This sharp rise is traceable chiefly to a strong demand for sheets, strips, soft steel bars and alloy bars for automotive consumption and to a generous flow of domestic tin plate specifications.

Finishing mills in the Pittsburgh area accordingly have expanded output measurably in the past week. Sheet mills now are operating at about 60 per cent of capacity, with strip mills virtually in step. Tin plate production has risen sharply to 60 to 65 per cent of capacity. Sheet steel piling orders are contributing substantially to some structural mill operating schedules. Wire mills are leaning heavily on automotive demand, which has expanded sufficiently to increase aggregate wire output. Tubular mills are maintaining the recent steady pace of operations.

In the Valleys and northern Ohio mills, production will average four points higher this week at 60 per cent, with a possibility of a higher rate toward the close of the week. Output in the Wheeling district is steady at 90 per cent, with one steel producer engaged at capacity.

In these districts current activity is sponsored almost entirely by insistent automotive demand. The chief source of encouragement to producers in the general advance in operations is that it has been initiated by a genuine demand for finished steel and not by artificial influences such as ruled toward the close of the second quarter last year, when activity reached the peak for 1934. There is, moreover, no evidence that consumers are stocking steel. Practically all current shipments are being specified urgently, indicating the need for material for prompt fabrication or conversion.

Steel producers in the Tri-State area are watching with interest the activities of the Tri-State flood control commission, which is strongly recommending that the Federal Government include in its public works program 13 flood control projects in this area. A large need for heavy steel would result from such projects if authorized in the Federal spending program.

Scrap is stronger at Pittsburgh, with No. 1 heavy melting steel at $13 to $14, delivered.

Pig Iron

Heating equipment manufacturers are melting on increased schedules. Aggregate movement of pig iron in this district, however, has increased slowly since the beginning of the year. Only occasional major lots are being booked, with reciprocal arrangements generally ruling. Activity still is largely on a spot basis. The Shenango furnace at Sharpsville, Pa., probably will be blown in within a week.

Semi-Finished Steel

Greater activity in this market is chiefly attributable to automotive demands. Sheet bars are benefiting by such business and also by sustained schedules at some non-integrated tin plate mills. Forging billets continue to hold favor from shops busy on orders from motor car centers.

Bolts, Nuts and Rivets

Specifications from the automotive industry in the past 10 days have been fairly substantial. Since the general application of the lower discounts on Jan. 1, however, aggregate demand has not been vigorous. The railroads are not buying except for prompt needs, and important ship work under way had previously been covered for requirements of bolts, nuts and rivets. Price concessions apparently have disappeared, and current discounts are holding strongly.

Rails and Track Accessories

The spotlight in this district is on the prospective purchase of 32,000 tons of steel rails this week by the Norfolk & Western. That road already has purchased part of its current requirements of track fastenings, including bolts and spikes, and will probably place the remainder of its needs in tie plates and joints this week. Other large rail and track accessory demand is apparently in the making, but specific inquiries are slow to reach this district. Miscellaneous railroad needs are generally restricted.

Reinforcing Steel

The Carnegie Steel Co. has been awarded 1750 tons of rail steel by the Frederick Snare Corpn., New York, general contractor, for the Tygarts River dam near Grafton, W. Va. Specifications for new post office construction are appearing, with further work of this character to be figured on in February. Most of the postal construction work will specify rail steel. Other new work is seasonally limited.

Bars

In addition to stronger demand from motor car centers, an increase in general specifications has accelerated merchant bar mill schedules rather generally in this district. Automotive tonnage continues to lead in daily bookings, with specifications from agricultural implement manufacturers in second place. Alloy bars are enjoying a strong demand for automotive consumption.

Cold Finished Steel Bars

Releases from automotive centers are being placed more regularly and for larger quantities. Otherwise this market is without important development. The jobbing trade is not adding a great deal to present activity. Farm implement makers continue to figure prominently in prospects for the latter half of January and next month.

Plates and Shapes

Interest in plates continues at a low ebb. Although a fair tonnage of pending barge work was carried into the new year, actual orders are not yet in sight. The other chief outlets are rather barren of prospects at the moment. Structural steel inquiries in the past week failed to reveal important new projects. The largest inquiry received in this district covered 1500 tons for railroad bridge construction by the New York Central in New York. Awards were featureless.

Wire Products

Improvement in this market since the beginning of the year has been moderate and has been sponsored chiefly by heavier automotive demand. Manufacturers' wire is in greatest demand. Wheel makers are taking a satisfactory volume of spoke wire. Bolt wire also is moving more rapidly. Jobbers continue to be cautious in specifying their needs, while agricultural demand is not at all lively. Enough improvement in the general market has appeared, however, to accelerate mill operations in the past 10 days.

Tubular Goods

General demand for tubular goods has varied only slightly in the past six weeks. At no time, however, has the tendency been sharply downward.

The movement of oil-country goods has been on an even keel for the past three months, and, with no untoward developments in the oil industry, requirements are expected to expand noticeably. There is a fair demand for those sizes going into automobile manufacture, with particular benefit to mechanical tubing. Business in seamless boiler tubes and locomotive tubes, as well as in lapweld steel pressure tubes, is still on a carlot basis.

Sheets

Full finished sheets for automotive construction are enjoying the strongest demand since last June. Miscellaneous takings also are encouraging, and sheet output this week is expected to average about 60 per cent of capacity. Jobbing mills are running far behind the general average. Galvanized sheets are not in unusual demand at this time. Black sheets are holding their own. Demand for enameling sheets for household utensils, while at present not exceptionally heavy, is expected to expand when electrical equipment manufacturers get under way with ambitious 1935 plans.

Tin Plate

A substantial flow of general specifications will boost the average output this week for the tin plate industry to about 60 per cent of capacity. The major share of this activity may be traced to actual specifications, but not all production is being shipped out, some of it being stocked against orders. A leading producer has received some favorable export business for shipment to the Far East. Some of the smaller independent mills are operating at near capacity, while the two leading mills are engaged at not less than 60 per cent of capacity.

Strip Steel

Automotive demand is the mainspring of current activity. A general crease in practically all classes of consumer demand, however, is a contributing influence in the acceleration of some strip mill schedules to 60 per cent of capacity. Increased requirements are in evidence from the agricultural implement manufacturers, furniture makers, and tubing and molding makers for ultimate use in bedsteads and bicycles. Some strip mills are maintaining fair backlogs for the first time in six months, and based on present orders will be able to hold the current average of about 55 to 60 per cent for the next several weeks. With no let-up in automotive demand yet in sight, prospects for sustained rolling schedules are considered favorable.

Coal and Coke

Unfavorable weather conditions have stimulated interest in domestic coke and coal in this district, but the recent warm weather had restricted the movement out of retail yards, and aggregate tonnage moving has thus remained at a low point. There is little change in demand for industrial fuel. Coke prices are well maintained, but quotations on bituminous coal are not generally representative of code price provisions.

Scrap

Prices have strengthened in the past week, with several grades quotably higher. The spread in the quotational range for No. 1 heavy melting steel is now definitely $1 a ton, at $13 to $14, delivered, this district. A mill has paid $14 for a round tonnage of ordinary No. 1 steel, while another consumer has covered for a significant tonnage at $13.50. Dealers, on the other hand, are offering only $13 to $13.25 to cover unfilled orders. Some dealers still are willing to sell further tonnages at $13.50, but the strong tone of railroad scrap has boosted the asking price for yard scrap in other directions. No. 1 heavy melting steel on the recent Pennsylvania Railroad list brought a dealer price of $14.35, delivered Steubenville, Ohio. With brokerage added, railroad scrap commands a premium of possibly 50c. to 75c. a ton above ordinary material. Interest in blast furnace grades is reappearing.

Scrap Prices Up Again In Boston Market

BOSTON, Jan. 15—Prices for those kinds of scrap that are moving in volume have again been raised. Export prices on No. 1 and No. 2 steel are easily 25c. a ton higher, with prospects of a further advance this week, as shippers are scrambling for tonnages. The market for similar steel for Pittsburgh delivery has automatically gone up 25c. a ton, although little if any scrap is moving to that district. Long bundled skeleton, forge scrap and similar materials are 50c. a ton higher, with moderate tonnages going to Pennsylvania. Prices otherwise have not changed noticeably. Occasional tonnages of chemical borings are moved to Long Island and New Jersey points, and steel turnings are being shipped to Pennsylvania, but there is little activity in other kinds of scrap, though demand for textile and machinery cast is expected to revive the latter part of this month, when foundries have completed their inventories.

Aside from the possible placing of 700 tons of No. 1X and No. 2X pig iron by the General Fire Extinguisher Co., Providence, R. I., no round tonnages of iron have been sold. Furnace representatives here assume that the Providence melter bought Dutch iron.

Southern pipe foundries are soliciting business in this territory and are naming prices slightly under those quoted by more Northern foundries.

Large Tonnages Out on Coast

SAN FRANCISCO, Jan. 14.—An inquiry for 26,000 tons of rails from the Southern Pacific Co. is one of the four new major projects which will require a total of more than 63,000 tons of steel, most of which will be purchased during the first quarter. It is reported that the Southern Pacific Co. will also take bids soon on 900,000 tie plates, 158,000 bolts and 6200 kegs of spikes in addition to the 26,000 tons of 112-lb. and 131-lb. rails.

From Almira, Wash., the Bureau of Reclamation announces that specifications will be obtainable shortly on the Grand Coulee dam materials which are estimated to cost $25,000,000. A listing of approximate quantities of steel are: 12,687 tons of reinforcing bars, 800 tons of structural steel not included in separate items; hydraulically operated gates, 3118 tons; butterfly valves and control apparatus, 1283 tons; penstocks, 4355 tons; trash racks and metal work, 2308 tons; bulkhead gates, 500 tons; metal tubing, 600 tons; track rails, 101 tons; one 150-ton gantry crane, three 10 to 75-ton cranes; 25 miles of metal sealing strips.

Of five units of the Trans-Bay bridge project which are yet to be placed under contract two will come up for bids during the first quarter. The structure at the east terminal of the bridge will afford traffic distribution to and from the East Shore Highway. Bids which will be opened about March 1 will include 1500 tons of reinforcing bars and 1250 tons of structural steel. A four-lane subway on the bridge highway will require 250 tons of reinforcing bars.

In commenting on the Colorado River aqueduct program F. E. Weymouth, general manager and chief engineer of the Metropolitan Water District of Southern California, says: "It is difficult to state exactly the quantities of steel that will be purchased in each of the four years remaining to complete the construction. It is safe to assume that large quantities of steel will be purchased this year." He continues: "The district estimates that about 105,100 tons of steel will be used for reinforcing purposes in the tunnels, conduits, canals, siphons and pumping plants of the aqueduct, and in construction of Parker dam. Approximately 110,800 tons of structural and plate steel will also be used in this construction work."

The Metropolitan Water District opens bids Jan. 16 for furnishing 4150 tons of hard-grade billet steel or rail steel bars, 1510 tons of intermediate grade billet steel bars and 170 tons of billet steel hoops. Additional contracts will be advertised soon for material which will probably include plates and structural shapes.

Chicago Ingot Rate Up Seven Points to 57 Per Cent

Steel Companies Bring in More Blast Furnaces and Foundries Melt More Pig Iron, Checking the Rise in Scrap Prices

CHICAGO, Jan. 15.—Ingot output has risen seven points to 57 per cent of capacity, and the pressure for shipments is unabated. Deliveries are becoming troublesome in the lighter products, with some mills booked ahead as far as six to eight weeks. New finished steel business and fresh specifications are the best in many months in spite of the fact that demands from the railroads and the building industry are at a low ebb. The strength of the present situation as contrasted with previous bulges in operations lies in the fact that, in addition to business from automobile plants, there is active demand from manufacturers of farm equipment. Tractor plants report a decided upturn in the use of new tractors on farms and they see 1935 as a year when production schedules will be maintained at high levels.

Steel mills are bringing in new blast furnaces, partly to counteract advancing prices for scrap. Illinois Steel Co. is adding two this week, one at Gary and one at South Works. The total for this company is now nine. Another effect of high scrap prices is the greater use of pig iron in foundries. These moves are tending to level off the rise in the scrap market, though difficulty in obtaining a number of grades of scrap is still an important factor in the market.

Pig Iron

New buying is in fair volume and more consumers are closing for the remainder of the quarter. With scrap prices high, more pig iron is going into foundry mixes. Current shipments are far outstripping the December rate and new business in sight leads sellers to expect February to mark a new high. Stove foundries are beginning to slow down after having had an unusually long early winter run.

Sheets

Some units are now booked full on cold-rolled products and deliveries range from four to eight weeks. Roofing can be had in ten days to two weeks and most hot-rolled products in about two weeks. The bulk of the tonnage is going to automobile plants, though miscellaneous requirements are better. Demand from jobbers remains light.

Cold Rolled Strip

Consumers are drawing more heavily against mills which are now operating at 60 to 65 per cent of capacity. On commercial runs deliveries range from two to three weeks and on special products shipments usually are from four to five weeks.

Rails

It is reported that the New York Central is seeking a Government loan to finance the purchase of 20,000 tons of rails. The St. Louis-San Francisco is also contemplating placing orders that will aggregate 13,000 tons, most of which will probably be placed with Southern mills. The plans of the Burlington are still rather indefinite, though mills expect orders before the end of winter. Track accessory business is spotty and light, which can be considered normal in view of the absence of contracts and corresponding winter shipping instructions. Demand for light rails is better, though still scattered.

Wire Products

The requirements of the manufacturing trades continue to expand and drafts on the mills are steadily increasing. As has been the case for weeks, automobile builders lead the procession and farm implement manufacturers take second place. In general, orders are increasing in average size, but they still are being placed for immediate delivery and use. Demand from jobbers is dull, partly because some of them still have stocks taken in many months ago. Along the entire length of seaboard and for some distance inland foreign made wire products are causing considerable concern to American producers.

Demand for copper wire and cable is better, this being especially true as to public utilities, which are beginning to spend more money.

Plates

Outstanding in a very thin market is 500 tons of steel pipe placed for use at Fort Peck, Mont. Other business is small and unimportant. Inland Steel Co. has ordered 175 1-ton mine cars, and here and there a railroad is taking a few fire box plates.

Structural Material

The Guttenberg, Iowa, dam has been closed and about 2500 tons of structural steel for that project will be fabricated in Detroit. Awards, except for the dam, are very light, but fresh inquiries, including 3000 tons for the Ashland Avenue, Chicago, bridge, are improved over a week ago.

Bars

Demand for bar mill products continues to set an ever increasing pace for other heavy tonnage products. Most forging shops in this district are now well engaged and makers of shafting are busy. The bulk of steel shipments eventually lands in automobile assembly departments, though a good portion is going into farm implements as well as tractors, which are experiencing an exceptional run of popularity not alone for general use but also on the farms of the country. The character of demand is well illustrated by the fact that many consumers who had placed orders for early February are now taking out the steel.

Reinforcing Bars

New business continues to drag, though the outlook is not unfavorable. The State of Illinois has awarded general contracts for about 11 miles of paving and on Jan. 18 will open bids on a round tonnage for highway bridges. A number of PWA jobs, ranging from 500 to 1000 tons each, are held in check pending Washington's approval of the low bidders. Four postal substations will soon be out in Chicago, and plans are still coming out for small outlying post offices. It is again reported but not confirmed, that the Milwaukee filtration plant, calling for 4000 tons, will be refigured, all bids having exceeded the preliminary estimates.

Cast Iron Pipe

Interest still drags because of winter weather, changes in local governments and the usual delays that are to be expected near the turn of the year. The outlook, however, is not unfavorable, since many PWA jobs have not yet been let and pipe foundries have a fair volume of contracts against which shipping instructions will be released with the arrival of open weather. Evanston, Ill., contemplates buying a tonnage for use as feeder mains.

Scrap

This market is somewhat easier and heavy melting steel is off to $12 a ton at the top. The use of automobile scrap is broadening and mills, in an effort to hold costs in line, are adding blast furnaces. Both of these factors have lessened the pressure against available supplies of railroad steel. Another influence is the increasing use of cast iron borings by steel mills.

Steel Demand Continues To Rise in New York

Sheet and Tin Plate Releases Improve—5150 Tons Placed for Tygart River Dam—Bids Postponed on West Side Track Depression Work

NEW YORK, Jan. 15.—Steel specifications continue to show a gain in this district, although by no means so rapid an increase as in sections of the country where automotive tonnage is the leading source of mill business. Sheet jobbers are replenishing their stocks and miscellaneous consumers, among them barrel makers, are taking more steel. Tin plate releases are especially promising and some tin mills expect to reach a 100 per cent operating rate before the end of January.

The plans of the railroads remain obscure. A number of lines have placed miscellaneous needs, including steel wheels and plates, shapes and bars for car repairs, but rail buying is slow in materializing. Some roads which had planned to enter the market for round tonnages may now buy small allotments, presumably with their own funds, and make additional purchases later in the year. The Delaware, Lackawana & Western, which recently bought 4000 tons, will probably place three orders of equal size at intervals during the rest of the year, making its total purchases 16,000 tons. The Atlantic Coast Line also is expected to limit its initial purchase to a relatively small tonnage.

The New York Central has advanced the taking of bids until today on 1800 tons of structural steel for track depression on the West Side of Manhattan from Forty-second to Fifty-third Streets. On highway elevation over tracks from Seventy-second to Seventy-sixth Streets, calling for 8000 tons, it will take figures Jan. 18. For track depression from Fifty-fourth to Sixty-fourth Streets, requiring 1600 tons, it will receive tenders on Jan. 29.

Frederick Snare Corpn., New York, has placed 5150 tons of steel for the Tygart River dam, Grafton, W. Va., with Steel corporation subsidiaries. The distribution was as follows: 1750 tons of concrete bars and 1500 tons of sheet steel piling to the Carnegie Steel Co., 1300 tons of structural steel to the American Bridge Co., and 600 tons of pipe to the National Tube Co.

The Amtorg Trading Corpn. is in the market for 500 tons of cold-rolled strip. Export demand generally shows improvement. Imports continue to be troublesome locally from the point of view of price competition.

Pig Iron

No significant development has appeared in this market. Furnace representatives continue to survive wholly on small-lot orders. Aggregate bookings during the past seven-day period amounted to around 1800 tons, as compared with 1500 tons in the preceding week. Foundries are taking deliveries quite regularly on what few contracts have been made. However, no purchaser is displaying any intention of building up an inventory, which is only natural in view of the price protection afforded by the code. This condition will probably remain unaltered until early March, at which time second quarter price developments may institute some form of buying movement.

Reinforcing Steel

Consumer demands for small lots of wire mesh and reinforcing bars are not as numerous as a month ago. However, distributers are looking forward to the awarding of a moderately large aggregate tonnage for highway construction which is still active in New York State and New Jersey. The Frederick Snare Corpn., New York, has awarded 1750 tons of bars to Carnegie Steel Co., to be used in a reservoir dam at Grafton, W. Va. About 160 tons for a bridge over the Pompton River in New Jersey has been placed with an unnamed interest, and Carroll-McCreary & Co., Inc., will furnish 150 tons of bars for a filtration plant at Hartford, Conn. Pending tonnages consist of 1000 tons for track depressions of the New York Central Railroad at New York, on which bids will be taken Jan. 15, 18 and 29. Bids are in on 150 tons for a school at Somerville, Mass., and tenders are being taken for general contracts on grade separations in Kings and Queens Counties, N. Y. These latter projects will require a total of 320 tons.

Scrap

Barge loadings are in lessened volume because of inclement weather. At the same time, pre-convention lassitude is being reflected in less energetic broker activity. In this area several boats are currently being loaded for the usual foreign mills, but smaller dealers are not releasing liberally at the present price level of $8.75 and $7.25 a ton for No. 1 and No. 2 steel respectively. Consequently there is every indication that these quotations will advance as soon as heavier tonnages are desired. A few new orders are being received from Japanese, English and Italian melters, but these buyers and local brokers are all loath to sign large forward orders in view of the general uncertainty regarding price movements over the next few months. A local Japanese house recently disposed of a distress lot of No. 1 in Japan at $14.15, thereby establishing a New York f.a.s. price of $10.30. However, the Southern Pacific Railroad list at Houston, Tex., has just been taken at $10.75 for No. 1. This in turn establishes a nominal f.a.s. price here of around $11.50 for Japanese delivery. If sizable sales should be made at this latter level, a spurt in dealer prices would probably ensue.

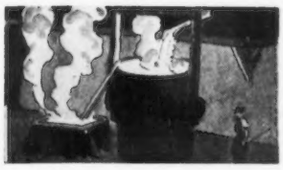
Canadian Scrap Prices Advance

TORONTO, ONT., Jan. 15.—New business gradually is expanding in the Canadian iron and steel markets. While actual sales made since the beginning of the year have been confined to small tonnage lots, several large contracts are said to be pending for early closing. The automotive industry now is in the market and a steady flow of orders are reported from this source with heavier buying anticipated in the early future. The mining industry has slowed down for the present, but large orders for equipment and supplies are being prepared for early placing. Building trades are dull, with little immediate change ahead. Steel mills and foundries are maintaining good operating schedules as a result of the betterment in small-lot business and it is expected that railroad orders soon will appear which will stimulate activities insofar as mills are concerned.

Demand for pig iron is improving. While most sales are in single car lots, repeat orders are more frequent than they were toward the close of 1934 and purchases for the past week exceeded 500 tons. Three furnaces are active, producing in excess of 1000 tons per day. Prices are firm and unchanged.

Price revisions have been made by local scrap dealers, and most grades now are quoted at higher prices than formerly. Offerings, however, are light and dealers are not bidding for scrap, although taking it as offered at the market. According to local dealers the mills in the Hamilton district again are taking heavy melting steel and some large shipments have been made on this account recently.

Cleveland Mills Are Pressed for Deliveries



But Ingot Output Remains at 69 Per Cent—Blast Furnace Started at Lorain—Automotive Demand Heavy

CLEVELAND, Jan. 15.—The heavy demand for finished steel from the automotive industry is being maintained and, while the peak may have been reached, the present volume of specifications from that source is not expected to fall off for some time.

Ingot output in the Cleveland-Lorain territory is unchanged this week at 69 per cent of capacity. The National Tube Co. today started up a blast furnace at Lorain and is now operating three out of five stacks.

Consumers are pressing for deliveries, and some of the sheet mills have accumulated considerable backlogs and have deferred deliveries two weeks or more. Hot-rolled strip mills are being crowded to capacity. Specifications for both plain carbon bars and alloy bars and billets from automobile manufacturers and parts makers are also heavy. While shipments of merchant bars have slowed down with some mills, others are still able to make quick deliveries. Stainless steel sheets and strip are in such heavy demand from automobile manufacturers that a leading producer is five weeks behind on deliveries, a situation that has never developed heretofore in the stainless steel industry. Miscellaneous demand for sheets has broadened, being largely from manufacturers of refrigerators and other household equipment, and bars are moving in better volume to agricultural implement manufacturers. Other consuming industries do not show much revival. Railroad inquiry is still lacking.

Bids will be asked shortly for a one-third part of a $9,000,000 Federal housing project in Cleveland. Latest information indicates that steel framing will not be used, but that the specifications will call for several hundred tons of reinforcing bars for floor construction.

Pig Iron

Shipments are on the uptrend and sales are holding to recent volume. While the demand is largely from the automotive industry, business from miscellaneous sources is improving. Sanitary ware manufacturers are under heavy production and are taking considerable pig iron, but business from manufacturers of heating equipment has declined. Agricultural implement manufacturers continue to take fair tonnages. The glass industry has become more active, resulting in an increasing demand for iron for bottle molds.

Sheets

There is a steady flow of new business from the automotive industry, and some mills have extended deliveries two or three weeks. Pressure from this source for shipments is unabated. Miscellaneous orders are good. Some of the refrigerator manufacturers have increased production schedules to around capacity. Job-enameling shops are buying quite freely.

Strip Steel

Demand improved the past week with the placing of new orders for sizable lots by the motor car industry. Some producers have accumulated a good backlog of orders for hot-rolled strip and are getting behind on deliveries. The recent gain in the demand for cold-rolled strip has been less than the improvement in sheets and hot strip. Some consumers are still slitting cold-rolled sheets for use as a substitute for cold-rolled strip, the recent downward revision in width extras of the latter product not having resulted in the entire elimination of that practice.

Iron Ore

Ore on docks at Lake Erie ports Jan. 1, amounted to 5,155,331 tons as compared with 5,326,674 tons on the same date a year ago. Shipments from docks during December were 93,387 tons as against 82,691 tons during the same month last year. Total shipments from these docks for the season were 11,191,155 tons as against 11,993,278 tons during 1933.

Bolts, Nuts and Rivets

Demand for bolts and nuts from the automotive industry is very good and is enabling manufacturers to step up production. Orders from railroads show some improvement. The new higher discount of 70, 10 and 10 per cent off list is now effective and a fair volume of business has been placed at the advance by the motor car industry and other consumers. Jobbers and some consumers placed orders for stock before the advance. Rivets have improved slightly although tank shops are showing very little activity.

Bars, Plates and Shapes

Bars are moving in heavy volume, with 75 per cent of the tonnage going to the automotive industry. Quick deliveries are usually demanded and in some cases mills are losing orders because more prompt shipments can be secured from other sources. Activity in the construction field is confined to small structural jobs. United States Engineers at Zanesville will take bids Jan. 18 for dam gages requiring 90 tons of stainless steel and some structural material for the Muskingum conservation project.

Scrap

A Youngstown district mill has purchased about 20,000 tons of steel making scrap at reported prices of $13.50 for No. 1 heavy melting steel and $12.75 for No. 2. The local market is quiet but very firm, with no further advance in prices. Dealers are paying quoted prices to fill orders for steel-making and blast furnace scrap recently placed by a Cleveland consumer.

Demand in Further Gain at Cincinnati

CINCINNATI, Jan. 15.—Anticipatory purchasing of pig iron has disappeared and melters are buying for needs only. Improvement, however, in the melt is reflected in heavier spot ordering and specifications, which now average close to 500 tons a week. Automobile foundries have increased their operations, bringing the district average to a higher level than December. Inexpensive stove castings have been stimulated by recent FERA purchases.

Heavier ordering of automotive sheets, combined with a general increase in demand, has raised aggregate bookings to 80 per cent of mill capacity. The unusual feature of current demand is the interest of jobbers in sheet purchases, mill interests reporting more than seasonal volume from that quarter. Rolling schedules are on a par with demand this week, with an almost capacity rate on cold-rolled grades.

Improvement in foundry operations is reflected in better shipments of industrial grades of coke. Moderate weather has curtailed domestic demand.

Small mill purchases of scrap have resulted in a mark-up of dealer's bids. Dealer confidence in the present upward movement is reflected in an increase of 75c. in heavy melting steel, which is now quotable at $9 to $9.50.

Buffalo Ingot Rate In Further Rise

BUFFALO, Jan. 15.—Open-hearth operations in this district have again been increased, with the addition of another active furnace to the battery now going at the Lackawanna plant of the Bethlehem Steel Corpn. This makes a total of 10 for this plant. Republic Steel Corpn. continues to operate five, and Wickwire-Spencer Corpn., one. The Seneca sheet division of Bethlehem has increased operations to 60 per cent of capacity.

A fair volume of small fabricating structural tonnage is looming up, but very little large work. A grade school at De Ruyter in Madison County will require 130 tons of steel.

The scrap market continues active and brisk. One mill bought a small tonnage of No. 1 and No. 2 heavy melting steel at $11.50 and $10.50 respectively. A large consumer has advanced its offering price for the second time, but cannot pick up the required tonnage. This mill will now pay $11.50 and $10 respectively for No. 1 and No. 2 heavy melting steel. Dealers reported to have taken a sizable order at $12 and $11 for these two grades some time ago are still offering $11.25 and $9.75. Small sales of No. 1 machinery cast and stove plate have been made at $11.50 to $12 and $10.50 to $11 respectively. The whole list is strong, and this strength is reflected in the outside markets.

Pig iron market is fairly active, with a constant flow of small sales and occasionally one of 300 to 500 tons.

Large New Public Job at St. Louis

ST. LOUIS, Jan. 15.—Bids are expected to be asked about April 1 for the superstructure of the St. Louis post office, requiring about 7000 tons of structural steel. The Missouri Highway Commission will open bids on Jan. 26 for bridges requiring 900 tons of structural steel, and for other projects requiring an undetermined tonnage of reinforcing bars. The Kansas City Structural Steel Co. has been awarded 800 tons for a highway bridge at Hutchinson, Kan.

Consumers of finished iron and steel in this district continue to mark time, specifications being largely confined to carlots. Manufacturers making materials for the automobile trade are busy.

December buying of pig iron established a record for several years past, and January is said to be proceeding at about the same rate. The prospects are for further heavy buying during the month. The jobbing foundry trade has taken a spurt. A large implement company in Illinois is said to have reemployed all of its old help, and expects to put on additional men. The stove trade is spotty; some plants have closed down for inventory and to make plans for the spring trade, while others are still going at the highest rate they have known for some time.

The scrap market continues strong. Offerings are light and there are no railroad lists locally before the trade, but dealers expect some buying within the next ten days. Selected heavy melting steel, No. 2 railroad wrought and railroad malleable are 25c. a ton higher; No. 1 and No. 2 heavy melting steel, miscellaneous standard-section rails, railroad springs, No. 1 railroad wrought, No. 1 machinery cast, railroad malleable and No. 1 railroad cast are 50c. a ton up.

Detroit Scrap Market Quiets Down

DETROIT, Jan. 15—The local scrap market has quieted down after the flurry of buying in the last month. While steel operations are at the highest point in months, with indications of further expansion, mills are comfortably stocked with scrap and seem to have enough commitments on present contracts to supply their needs for the near future. It is not likely, therefore, that there will be much fresh buying in the next few weeks. Prices, however, are well maintained and, with the exception of one item, have not changed.

Railroad Equipment

Sorocabana Railway has ordered four 4-10-2 type locomotives from the American Locomotive Co. Dr. L. Orsini is traffic manager, Sao Paulo, Brazil.

Burlington Transportation Co. has ordered 10 streamlined motor coaches from General Motors Corpn.

Inland Steel Co. has ordered 175 1-ton mine cars from American Car & Foundry Co.

RAILS

Southern Pacific will take bids soon at San Francisco on 26,000 tons of 112 and 131-lb. rails, 600,000 tie plates for 112 lb. rails, 300,000 tie plates for 131-lb. rails, 158,000 bolts and 6200 kegs of spikes.

SEC Simplifies Registration Laws

WASHINGTON, Jan. 15.—Flotation of a heavy volume of new capital issues and large refunding operations by durable goods industries are looked for by both Administration officials and investment interests as the result of simplified registration regulations announced by Joseph P. Kennedy, chairman of the Securities and Exchange Commission. Members of the Investment Bankers Association code committee, at a meeting here today, are studying the new regulations. Pending a careful analysis, they share views of prominent heads of industries and savings and other banks that the liberalized regulations will prove a great stimulus to the durable goods industry.

Greer Steel Co. to Build New Mill

GREER STEEL CO., Dover, Ohio, manufacturer of cold rolled strip specialties, has purchased about 35 acres of land at Anderson, Ind., for a new branch plant, to consist of several units. Although plans are not definitely set up, the company expects to have installed a continuous cold strip mill for producing strip up to 48 in. wide, with a capacity of 3000 to 5000 tons a month. The company's capacity at its Dover plant is approximately 5000 tons a month. The new branch plant with equipment is estimated to cost approximately $500,000, and may be under construction early next spring.

Production Symposium At S. A. E. Meeting

OUTSTANDING recent developments in production machinery and methods are the general topic of a symposium to be held by the Society of Automotive Engineers at the Book-Cadillac Hotel, Detroit, on the evening of Jan. 18. This symposium will be the concluding session of the society's annual meeting, which opened Jan. 14.

Papers and addresses will include: "What Is Surface Finish and How Can It Be Measured?" by E. J. Abbott, University of Michigan, and "Surface Integrity and Dynamic Strength," by A. V. DeForrest, Massachusetts Institute of Technology. Developments during 1934 in cam and cylindrical grinding will be discussed by Howard Dunbar, Norton Co., and single point boring of cylinders and diamond turning of pistons, by W. F. Wise, Ex-Cell-O Aircraft & Tool Corpn. P. W. Fassler, P. W. Fassler & Co., will speak on "Modern Resistance Welding in the Automobile Industry." The fuels and lubricant session in the afternoon of Jan. 18 will include a paper on "Lubrication Requirements of Automotive Worm Gearing," by C. H. Schlesman, Socony-Vacuum Corpn.

Heyl & Patterson, Inc., Pittsburgh, has received contract from the Norfolk & Western Railroad for an electric high-lift coal car dumper to be installed at Lambert Point, Va. The dumper is capable of handling 5000 tons of coal an hour and will be used for unloading coal from railroad cars to steamers.

Philadelphia Operations Move Up One Point to 29 Per Cent

District Mills Come Into Market for No. 1 Steel Scrap at $12 a Ton—Autobody Plants Increase Sheet Steel Purchases

PHILADELPHIA, Jan. 15.—Sellers of sheets report that consumer demands for autobody material have picked up considerably during the past week. Inasmuch as late February delivery is the best obtainable, it is assumed that this industry expects heavier operations during that month. Also, light tank builders have become more active, and some of the smaller mills in this territory are receiving better orders for blue-annealed sheets.

All of this improvement is more than offset by the failure of heavy products to move into consumption. Plates are dormant, and shapes are not much more active, inasmuch as highway demands have tapered off during the past six weeks.

Although the Philadelphia area is comparatively quiet from the standpoint of tonnage business, a somewhat better miscellaneous demand has appeared. Bethlehem has started melting in three open-hearths at Steelton, Pa., and operations at Sparrows Point, Md., are slightly better. One smaller district mill has placed an additional furnace in production, and the aggregate district operating rate has advanced one point to 29 per cent of capacity. At Pencoyd, three furnaces are again active, and both the small and large structural mills are in production.

Neither the Pennsylvania nor Reading railroad has indicated that any steel purchases will be made to build or repair rolling stock. There is little likelihood that the Pennsylvania will buy rails, inasmuch as a considerable part of last year's purchases is still stored.

Pig Iron

The slackening of foundry melt occasioned by the holiday and inventory periods has apparently passed. Furnace representatives have experienced a moderate expansion in demands for fill-in lots for nearby delivery, although aggregate bookings of sellers are still far from a satisfactory level. There is no indication that basic iron inquiries will get much heavier during the next few months, and foundries apparently have no intention of building up inventories.

Sheets

Automobile sheets are being purchased daily in substantial amounts by the two local autobody stamping plants. Buyers here are finding it difficult to obtain delivery before late February. The current practice is to place new orders with the seller offering the best delivery. Blue annealed sheets likewise are in better demand, although not in the same proportions as automobile material. This improvement in annealed sheets is coming from increased activity of fabricators of light oil tanks, hot water tanks, etc.

Bars, Plates and Shapes

Light bars and channels are temporarily quite active, but heavier material is very dull. Miscellaneous demand for building bars has fallen off somewhat, and the requirements for highway work in Pennsylvania and New Jersey are not as heavy as in the fourth quarter. On Jan. 25 the Navy Department will open tenders on 797 tons of bars for stock purposes. Plate sellers report that demands have fallen to a low point, with the railroads out of the market for many months and shipbuilders with practically no private business on their books. The only plate inquiry of importance during the week was for 1500 tons for Navy Department stocks on which bids will be taken Jan. 25. The Interstate Railroad Co. is inquiring for plates to repair 150 hopper cars. Sellers of structural shapes are experiencing a temporarily quiet period. The Ross Galvanizing Co., Philadelphia, has been awarded 325 tons of galvanized shapes by the Navy Department.

Scrap

Taking their cue from the high prices paid in Pittsburgh for the Pennsylvania Railroad list last week, dealers in this area are scurrying around to secure as much steel as their individual finances permit. Consequently brokers are being pressed by advancing prices from underneath, and have been forced to raise offers in order to secure adequate material to cover foreign and domestic commitments. Several sales of No. 1 heavy melting steel were made to mills in this district during the week, at prices ranging around $12 a ton. Also, Bethlehem has purchased about 400 tons of selected steel at $12 for delivery at Steelton, Pa., where three furnaces have been put back into operation. The rising domestic market is drawing material away from Port Richmond and exporting brokers have raised quotations there 50c. to $10.50 and $9.50 for No. 1 and No. 2 respectively, in order to complete accumulations for a Japanese boat due today and an Italian boat scheduled to dock tomorrow.

Imports

The following iron and steel imports were received here last week from Sweden: 155 tons of sponge iron, 90 tons of steel tubes, 31 tons of steel bars, 21 tons of steel wire and 19 tons of steel forgings.

Rail Orders in Sight In South

BIRMINGHAM, Jan. 15.—The pig iron market is slowly moving upward from the low point of the holiday season. Spot orders are more numerous and the current volume is now about the same as in early December. Further gains are expected, as stocks of many foundries are believed to be low. The price continues at $14.50 for both spot and contract tonnage.

Six blast furnaces are being operated in the district, three by the Tennessee company and one each by Woodward Iron Co., Republic Steel Corpn., and the Sloss-Sheffield Steel & Iron Co.

For five days last week Ensley No. 6 furnace of the Tennessee company, banked several months, was operated for rebanking. This was done on Friday.

Steel

Railroad tonnage is beginning to materialize, and it is hoped that a sufficient amount will be booked in the next few weeks to warrant resumption of the Ensley rail mill. The president of the Louisville & Nashville, who was in Birmingham last week on an inspection trip, announced that his railroad would soon place a large order. It is thought this will be around 25,000 or 30,000 tons.

Bookings of sheets and wire products have been fairly steady, with occasional orders for heavy grades.

There was no change in open-hearth operations last week, seven units being worked. This week there will also be seven, with a possibility of an increase to eight.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel — *Base per Lb.*

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.09c.
Del'd New York	2.13c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

Base per Lb.

F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

Base per Net Ton

F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

Base per Lb.

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.985c.
Del'd New York	2.08c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.005c.
Del'd New York	2.0525c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

Base per Lb

No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	3.35c.

Tin Plate *Per Base Box*

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

Base per Lb.

All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.88c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

Base per Lb.

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade — *Per Lb.*

Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

Base per Keg

Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Base per 100 Lb.

Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Off List

F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	53½	35	¼ & ⅜	+1½	+21½
½	58½	47	½	31½	15
¾	62	52	⅝	36½	20½
1 to 3	64	55	¾ to 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	38	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
3¼ in. o.d.	11 B.W.G.	25.22	22.93
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.96

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
10,000 lb. or ft. to 24,999 lb. or ft.	12½%
2,000 lb. or ft. to 9,999 lb. or ft.	25 %
Under 2,000 lb. or ft.	40 %

Hot-Finished Lapweld Steel Pressure Tubes

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

1½ in. o.d	13 B.W.G.	$ 9.72
1¾ in. o.d.	13 B.W.G.	11.06
2 in. o.d.	13 B.W.G.	12.38
2¼ in. o.d.	13 B.W.G.	13.79
2½ in. o.d.	12 B.W.G.	16.58
2¾ in. o.d.	12 B.W.G.	17.54
3 in. o.d.	12 B.W.G.	18.35
3¼ in. o.d.	11 B.W.G.	21.56
3½ in. o.d.	11 B.W.G.	23.15
4 in. o.d.	10 B.W.G.	28.86
4½ in. o.d.	10 B.W.G.	35.22
5 in. o.d.	9 B.W.G.	44.25
6 in. o.d.	7 B.W.G.	68.14

Quantity Extras:

40,000 lb. or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5 %
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½%
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25 %
Under 2,000 lb. or ft.	plus 40 %

CHARCOAL IRON BOILER TUBES

Base Discounts, f.o.b. Pittsburgh

In. O. D.	
1½ and 1¾	44
2 —2¼	13 and 10
2½—2¾	16 and 10
3	17 and 10
3¼—3½	18 and 10
4	20 and 10
4½, 5, 6	21 and 10

Extras for quantity: For 1½ to 1¾, up 8 points under 10,000 lb., up 4 points 10,000 lb. to carload. For 2 in. to 5¾ in., up 2 points without supplementary 10 per cent, under 10,000 lb.; supplementary 5 per cent instead of supplementary 10 per cent for 10,000 lb. to carload.

In sizes 2 in. to 4½ in. O.D. inclusive, all tubes more than four gages heavier than standard are priced per lb. as follows: Carload and over, 9c.; extras for quantity—under 10,000 lb. 1c. per lb., 10,000 lb. to carload ½c. per lb.

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$47.00
*4-in., del'd Chicago	50.00
6-in. and larger, del'd New York	45.00
4-in. del'd New York	48.00
6-in. and larger, Birmingham	39.00
4-in. Birmingham	42.00

Class "A" and gas pipe, $3 extra

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46 and 4-in. pipe $49 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

Base per 100 Lb.

Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 10
Carriage bolts	70, 10 and 10
Lag bolts	70, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 10
Hot-pressed nuts, blank or tapped, square	70, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons	70, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 10
Semi-finished hexagon nuts, U.S.S. all sizes	70, 10 and 10
Semi-finished hexagon nuts, S.A.E. ¼ in. to 7/16 in. diameter	75, 10 and 10
½ in. to 1 in. diameter	75, 10 and 10
Larger than 1 in. diameter	75, 10 and 10
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, P'gh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 10

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	80, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¼ in. and smaller	75
Inct hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Inct set screws, cut and oval point	75 and 10 to 80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped.....$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.45c.
Delivered price at Detroit is.....2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2xx (½% Nickel)	$0.25
2xx (1¼% Nickel)	0.55
2xx (3½% Nickel)	1.50
2xx (5% Nickel)	2.25
3xx Nickel Chromium	0.55
3xx Nickel Chromium	1.35
3xx Nickel Chromium	3.80
3xx Nickel Chromium	3.20
4xx Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4xx Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4xx Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5xx Chromium Steel (0.60 to 0.90 Chromium)	0.35
5xx Chromium Steel (0.80 to 1.10 Chromium)	0.45
6xx Chromium Spring Steel	base
6xx Chromium Vanadium Bar	1.20
6xx Chromium Vanadium Spring Steel	0.70
9xx Chromium Nickel Vanadium	1.50
6xx Chrom Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with cross section area of 16 in. and 2½ in. thick may take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a 2 per ton price, which is the net price for billets for the same analysis. Larger sizes have extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Forging slabs	15c.
Bars	23c.
Structural shapes	26c.
Plates	23c.
Sheets	33c.
Cold-rolled strip	20½c.
Hot-rolled strip	27c.
Plain wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped.....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped.....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	32.00

Delivered Detroit

Rerolling	$30.00
Forging	35.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	34.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	.....	.....	19.00	.....
Sparrows Point, Md.	19.50	.....	19.00	.....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	.....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	.....
Duluth, Minn.	19.00	19.00	.....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn				
From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.				
From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia				
From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati				
From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio				
From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio				
From Hamilton, Ohio	20.50	20.50	.....	.....
Mansfield, Ohio				
From Cleveland and Toledo	20.26	20.26	.....	.....
Indianapolis				
From Hamilton, Ohio	20.77	20.77	.....	.....
South Bend, Ind.				
From Chicago	20.55	20.55	.....	.....
Milwaukee				
From Chicago	19.50	19.50	.....	.....
St. Paul				
From Duluth	20.94	.....	.....	.....
Davenport, Iowa				
From Chicago	20.26	20.26	.....	.....
Kansas City				
From Granite City	21.04	21.04	.....	.....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.....$23.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.04
Delivered Buffalo	24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C. f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.00 to $14.00
No. 2 heavy melting steel	12.00 to 12.50
No. 2 railroad wrought	13.00 to 13.50
Scrap rails	13.00 to 13.50
Rails 3 ft. and under	14.50 to 15.00
Compressed sheet steel	12.75 to 13.25
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	10.00 to 10.50
Machine shop turnings	8.50 to 9.00
Short shov. turnings	8.50 to 9.00
Short mixed borings and turnings	6.50 to 7.00
Cast iron borings	6.50 to 7.00
Cast iron carwheels	12.75 to 13.25
Heavy breakable cast	11.50 to 12.00
No. 1 cast	12.50 to 13.00
Rails, knuckles and couplers	14.00 to 14.50
Rail, coil and leaf springs	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	15.00 to 15.50
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	14.00 to 14.50
Steel car axles	14.00 to 14.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel	$11.50 to $12.00
Automobile hvy. melt. steel	10.50 to 11.00
Shoveling steel	11.50 to 12.00
Hydraulic comp. sheets	10.50 to 11.00
Drop forge flashings	10.50 to 11.00
No. 1 busheling	10.50 to 11.00
Rolled carwheels	13.00 to 13.50
Railroad tires	13.00 to 13.50
Railroad leaf springs	13.00 to 13.50
Axle turnings	11.00 to 11.50
Steel couplers and knuckles	13.00 to 13.50
Coil springs	13.00 to 13.50
Axle turnings (elec. fur.)	11.00 to 11.50
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	14.00 to 14.50
Cast iron borings	7.00 to 7.50
Short shoveling turnings	7.00 to 7.50
Machine shop turnings	5.50 to 6.00
Rerolling rails	13.00 to 13.50
Steel rails, less than 3 ft.	14.00 to 14.50
Steel rails, less than 2 ft.	14.50 to 15.00
Angle bars, steel	13.00 to 13.50
Cast iron carwheels	12.00 to 12.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	10.00 to 10.50

Per Net Ton

Iron car axles	$16.50 to $17.00
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	11.00 to 11.50
No. 2 busheling	5.50 to 6.00
Locomotive tires, smooth	10.00 to 10.50
Pipe and flues	5.50 to 6.00
No. 1 machinery cast	11.00 to 11.50
Clean automobile cast	11.00 to 11.50
No. 1 railroad cast	10.00 to 10.50
No. 1 agricultural cast	9.50 to 10.00
Stove plate	6.50 to 7.00
Grate bars	6.50 to 7.00
Brake shoes	7.25 to 7.75

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.00 to 10.50
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets	.... 9.00
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	6.50 to 7.00
Machine shop turnings	6.50 to 7.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Heavy breakable cast	10.25 to 10.50
Stove plate (steel works)	8.50 to 9.00
No. 1 low phos. heavy	15.00 to 15.50
Couplers and knuckles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
No. 1 blast furnace	5.00 to 5.50
Snec. iron and steel pipe	.... 8.00
Shafting	17.00 to 17.50
Steel axles	16.50 to 17.00
No. 1 forge fire	.... 9.00
Cast iron car wheels	11.50 to 12.00
No. 1 cast	11.00 to 11.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	.... 12.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$9.00 to $9.50
Scrap rails for melting	9.00 to 9.50
Loose sheet clippings	6.50 to 7.00
Bundled sheets	7.00 to 7.50
Cast iron borings	5.50 to 6.00
Machine shop turnings	5.50 to 6.00
No. 1 busheling	7.00 to 7.50
No. 2 busheling	3.75 to 4.25
Rails for rolling	10.00 to 10.50
No. 1 locomotive tires	8.25 to 8.75
Short rails	12.50 to 13.00
Cast iron carwheels	9.00 to 9.50
No. 1 machinery cast	10.25 to 10.75
No. 1 railroad cast	9.50 to 10.00
Burnt cast	7.00 to 7.50
Stove plate	7.00 to 7.50
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.00 to 10.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.00 to $11.50
No. 2 heavy melting steel	10.50 to 11.00
Compressed sheet steel	10.50 to 11.00
Light bundled sheet stampings	8.50 to 9.00
Drop forge flashings	9.50 to 10.00
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.50 to 8.00
No. 1 busheling	9.50 to 10.00
Steel axle turnings	9.50 to 10.00
Low phos. billet crops	14.50 to 15.00
Cast iron borings	7.50 to 8.00
Mixed borings and short turnings	7.50 to 8.00
No. 2 busheling	7.50 to 8.00
No. 1 cast	12.50 to 13.00
Railroad grate bars	7.00 to 7.50
Stove plate	8.00 to 8.50
Rails under 3 ft.	15.00 to 15.50
Rails for rolling	15.50 to 18.00
Railroad malleable	12.00 to 12.50
Cast iron carwheels	.... 12.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting scrap	10.50 to 11.00
Scrap rails	11.00 to 11.50
New hydraul. comp. sheets	10.50 to 11.00
Old hydraul. comp. sheets	8.75 to 9.25
Drop forge flashings	10.50 to 11.00
No. 1 busheling	10.50 to 11.00
Hvy. steel axle turnings	7.00 to 7.50
Machine shop turnings	5.75 to 6.25
Knuckles and couplers	13.00 to 13.50
Coil and leaf springs	13.00 to 13.50
Rolled steel wheels	13.00 to 13.50
Low phos. billet crops	13.25 to 13.75
Short shov. steel turnings	6.75 to 7.25
Short mixed borings and turnings	6.75 to 7.25
Cast iron borings	6.75 to 7.25
No. 2 busheling	6.50 to 7.00
Steel car axles	12.00 to 12.50
Iron axles	12.00 to 12.50
No. 1 machinery cast	12.00 to 12.50
No. 1 cupola cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Steel rails, 3 ft. and under	13.50 to 14.00
Cast iron carwheels	11.00 to 11.50
Industrial malleable	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Chemical borings	7.00 to 7.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$9.00 to $9.25
No 1 heavy melting steel	7.25 to 7.50
Scrap T rails	7.50 to 7.75
*No. 2 steel	8.00 to 8.25
No. 2 steel	6.25 to 6.50
Breakable cast	6.00 to 6.50
Machine shop turnings	2.75 to 3.00
Bundled skeleton, long	6.00 to 6.25
Forge flashings	6.00 to 6.25
Shafting	11.50 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
Stove plate	4.00 to 4.25

Per gross ton delivered consumers' yards:

Textile cast	$9.00 to $9.50
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$7.25 †8.75
No. 2 heavy melting steel	*5.75 to †7.25
Heavy breakable cast	6.75 to 7.25
No. 1 machinery cast	7.50 to 8.00
No. 2 cast	6.50 to 7.00
Stove plate	5.75 to 6.25
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	9.00 to 9.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.50
No 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	.... $9.00
Scrap steel rails	.... 10.00
Short shoveling turnings	.... 6.50
Stove plates	.... 6.50
Steel axles	10.00 to 10.50
Iron axles	10.00 to 10.50
No. 1 railroad wrought	.... 6.50
Rails for rolling	11.00 to 12.00
No. 1 cast	9.50 to 10.00
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	.... 8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$9.25 to $9.75
No. 1 heavy melting	8.50 to 9.00
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	10.00 to 10.50
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	9.25 to 9.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	2.50 to 3.00
Rails for rolling	11.00 to 11.50
Machine shop turnings	2.50 to 3.00
Heavy turnings	5.50 to 6.00
Steel car axles	13.50 to 14.00
Iron car axles	13.50 to 14.00
No. 1 railroad wrought	7.50 to 8.00
Steel rails less than 3 ft.	11.75 to 12.25
Steel angle bars	9.50 to 10.00
Cast iron carwheels	8.25 to 9.25
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.00 to 9.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$9.00 to $9.50
Borings and short turnings	5.50 to 6.00
Long turnings	$5.00 to $5.50
No. 1 machinery cast	10.50 to 11.00
Automotive cast	10.75 to 11.50
Hydraul. comp. sheets	9.50 to 10.00
Stove plate	6.50 to 7.00
New factory busheling	7.75 to 8.00
Old No. 2 busheling	5.00 to 5.50
Sheet clippings	6.00 to 6.50
Flashings	8.50 to 9.00
Low phos. plate scrap	9.75 to 10.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.50
Rails scrap	8.00	7.50
Machine shop turnings	3.00	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	3.50
Cast borings	4.00	3.00
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	6.00
Axles wrought iron	7.00	6.50
No. 1 machinery cast	9.00	8.00
Stove plate	5.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.50
Tungsten, domestic scheelite, delivered†	17.00

Per Gross Ton

Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

Per Net Ton

Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$15.50 to $16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$15.50 to 16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton

Furnace, f.o.b. Connellsville Prompt	$3.85
Foundry, f.o.b. Connellsville Prompt	$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	9.75
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	6.00
Foundry, by-product, del'd St. Louis	8.00

Coal

Per Net T

Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.0
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.2
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.3
Mine run gas coal f.o.b. Pa. mines	2.05 to 2.1
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.8
Gas slack, f.o.b. W. Pa. mines	1.90 to 1.9

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.0
No. 4 industrial	3.5

Per Gal. f.o.b. Baltimore

No. 3 distillate	4.0
No. 4 industrial	3.5

Per Gal. del'd Chicago

No. 3 industrial fuel oil	3.9
No. 5 industrial fuel oil	3.3

Per Gal. f.o.b. Cleveland

No. 3 distillate	3.5
No. 4 industrial	3.2
No. 5 industrial	4.0

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works

	High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.0
Maryland	45.00	40.0
New Jersey	55.00	43.0
Ohio	45.00	40.0
Kentucky	45.00	40.0
Missouri	45.00	40.0
Illinois	45.00	40.0
Ground fire clay, per ton	7.00	

Chrome Brick

Per Net To

Standard size	$45.0

Silica Brick

Per 1000 f.o.b. Wor

Pennsylvania	$45.0
Chicago	54.0
Birmingham	53.0
Silica clay, per ton	8.0

Magnesite Brick

Per Net To

Standard size, burned, f.o.b. Baltimore and Chester, Pa.	$45.0
Unburned, f.o.b. Baltimore	55.0
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.0
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.0
Domestic, f.o.b. Chewelah, Wash	55.0

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.15c.
Structural shapes	3.15c
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70
Bd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05
Cement c't'd nails, base per keg	3.05

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK

	Base per Lb
Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.22c.
Iron bars	3.22c.
Iron bars, swed. charcoal	6.75c. to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-rolled; strip, soft and quarter hard	3.32c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'l'd sheets (No. 24*)	3.85c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.25c.
Wire, galv. (No. 10)	3.85c.
Tire steel, 1 x ¼ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c
Common wire nails, base, per keg	$3.21
	Per Cent Off List
Machine bolts, cut thread: All diameters	70
Carriage bolts, cut thread: All diameters	70
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Galv. sheets (No. 24)	4.79c.
Hot-rolled sheets (No. 10)	3.29c.
Black corrug. sheets (No. 24)	4.09c.
*Galv. corrug. sheets	4.79c
Structural rivets	3.99c.
Boiler rivets	4.09c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
1000 lb. or over	70 and 10
200 to 999 lb.	67½ and 10
100 to 199 lb.	65 and 10
Less than 100 lb.	60 and 10

*No. 26 and lighter take special prices

PHILADELPHIA

	Base per Lb
*Plates, ¼-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c
*Cold-finished steel bars	3.75c
*Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.55c.
†Galvanized sheets (No. 24)	4.25c.
*Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.

†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.45c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.91
Com. wire nails, base per keg (1 to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

BUFFALO

	Base per Lb.
Plates	3.27c.
Struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	$3.25
Black wire, base per 100 lb.	3.55c.

BOSTON

	Per Lb. Base
Beams, channels, angles, tees, zees	3.52c.
H beams and shapes	3.52c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.53c.
Floor plates, diamond pattern	5.33c
Bar and bar shapes (mild steel)	3.30c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c. to 4.60c.
Half rounds, half ovals, ovals and bevels	4.55c.
Tire steel	4.55c.
Cold-finished rounds and hexagons	5.25c.
Cold-rolled strip steel	3.245c.
Cold-finished squares and flats	4.30c.
Blue annealed sheets, No. 10 gal.	3.60c.
One pass cold-rolled sheets No. 24 ga.	4.15c.
Galvanized steel sheets, No. 24 ga.	4.85c.
Lead coated sheets, No. 24 ga.	5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c.
Shapes, standard	3.55c.	3.70c.	3.55c
Soft steel bars	3.60c.	3.70c.	3.60c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.45c.	4.40c
Hot-rolled sheets (No. 10)	3.75c.	3.80c.	3.75c.
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel:			
Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails—base per keg less carload	$3.40	$3.25	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

	Base per Lb.
High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Steel Board Hears Petition For Another Election

WASHINGTON, Jan. 15. — The National Steel Labor Relations Board today ordered a further hearing on a petition for an election at the Clearing, Ill., plant of the Continental Can Co. The hearing, to be held in Washington, is to determine whether the company is engaged in interstate commerce. The petition for an election is sponsored by Clearing Lodge No. 55, Amalgamated Association of Iron, Steel and Tin Workers. The date of the hearing has not been set.

New Reorganization Plan for Cable Maker

A GROUP of stockholders of the Williamsport Wire Rope Co., Williamsport, Pa., is presenting a reorganization plan in opposition to a former arrangement whereby the company was to have been operated by a newly formed subsidiary of the Bethlehem Steel Corpn. The new plan provides for the sale of new bonds to the United States Steel Corpn. and would continue the company as an independent organization by leaving the equity in the hands of the present owners of the preferred and common stock.

Navy Department Buys Plates and Shapes

WASHINGTON, Jan. 15. — The Navy Department has awarded contracts for 1449 tons of black and galvanized shapes and 2512 tons of plates for the construction of the cruiser *Wichita*. The shapes were distributed as follows: Carnegie Steel Co., 588; Joseph P. Cattie & Brothers, 266; Phoenix Iron Works, 140; Jones & Laughlin Steel Corpn., 132; Bethlehem Steel Co., 112; Enterprise Galvanizing Co., 73; Ross Galvanizing Co., 47; Inland Steel Co., 46; Joseph T. Ryerson & Son, Inc., 30; Penn Galvanizing Co., 15.

Of the plates, 1962 tons were awarded by lot, while an additional 550 tons went to the Youngstown Sheet & Tube Co. The awards made by lot were distributed as follows: Carnegie Steel Co., 480 tons; Worth Steel Co., 800 tons; Bethlehem Steel Co., 250 tons; Jones & Laughlin Steel Corpn., 70 tons; Inland Steel Co., 187 tons; Central Iron & Steel Co., 75 tons; Ross Galvanizing Co., 75 tons; Alan Wood Steel Co., 25 tons.

The department also has awarded 155 tons of steel rivets for the *Wichita*, 152 tons going to the Anthony Carlin Co., and three tons to the Bayonne Bolt Co.

The Workshop.—General Electric Co., Nela Park, Cleveland. Bulletin, 16 pages, descriptive of the new G-E "Workshop," tools and attachments. Illustrations of both home and shop uses in wood and light metal operations. Companion bulletin gives details of setting-up and operating procedure.

Copper Buying Well Maintained — Tin Prices Decline on Dollar Strength

Lead Market Comparatively Active with Prices Strong— Spelter Sales Totaled 4000 Tons in Past Week

NEW YORK, Jan. 15. — While copper sales are still averaging about 1000 tons daily and total transactions this month have amounted to 11,500 tons, the market is by no means buoyant. December statistics, revealing a large increase in domestic stocks, were not encouraging, although it was to be expected that consumers would keep their deliveries at a minimum in the last month of the year. Shipments thus far in January have shown a substantial increase. The Blue Eagle price remains unchanged at 9c. a lb., delivered Connecticut Valley, while quotations in London this morning ranged from 6.85c. to 6.90c. a lb., usual Continental base ports. The conference of world producers scheduled for this month at which plans for production curtailment were to be discussed has met with delays and conversations on the same subject in New York will certainly be postponed until February.

Tin

After rising to 51.25c. a lb. in the middle of last week, tin prices weakened rather sharply yesterday and the market at noon today was quotable even lower at 50.55c. Strength of the dollar against sterling was partially responsible for this movement, but the weaker market abroad was rather unusual in view of favorable December statistics. Dollar strength was naturally attributable to the pending Supreme Court action on gold devaluation. The London market this morning had fallen under the level of one week ago, with spot metal quotable at £230 12s. 6d. and futures at £228 17s. 6d. In the East, the price at Singapore was £231 15s. Price weakness here developed some buying this week and the rise in tin plate operations to 60 per cent of capacity is expected to attract more purchasers in the near future.

Lead

The market is hardly active, but is the most satisfactory of the metal group. Prices are steady at 3.55c., St. Louis, and 3.70c., New York, and day-to-day demand is being well maintained. Buyers seem to be making purchases entirely in line with their needs and some January metal is yet to be placed. February is not nearly covered and sellers expect little real activity in this position until next week. Paint makers are taking lead steadily and during the last week battery producers, tin foil manufacturers, cable makers and jobbers have been in the market. The lead ore market is steady at $36 a ton.

Zinc

Although sales last week are reported to have amounted to 4000 tons, the market did not appear to be that active. Quiet coverage of regular customers seems to be constituting the bulk of current activity and many sellers are taking only such business as they are forced to accommodate at the 3.55c., East St. Louis, price level. Very little second quarter spelter is being offered at a premium of $1 a ton. According to the Prime Western Zinc Producers Committee of the American Zinc Institute, 5730 tons of Prime Western was sold during December for delivery in that month at a weighted average selling price of 3.715c., East St. Louis. December sales for subsequent delivery were 11,635 tons, at a weighted average price of 3.720c. a lb. Ore prices are unchanged and production totaled 8400 tons last week, compared with shipments of 5700 tons and sales of 8400 tons.

Ingot Brass and Bronze

The Non-Ferrous Ingot Metal Institute reports that in the 28-day period ended Dec. 28 the average prices paid for commercial 80-10-10 and commercial 85-5-5-5 brass ingots were 9.794c. a lb. and 8.268c. a lb respectively, compared with 9.864c. and 8.278c. a lb. respectively in the preceding four-week period.

Orders received by the General Electric Co. during 1934 amounted to $183,660,303, compared with $142,770,791 for 1933, an increase of 29 per cent, according to Gerard Swope, president of the company. Orders for the quarter ended Dec. 31 amounted to $51,046,760, compared with $37,985,790 for the last quarter of 1933, an increase of 34 per cent.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 9	Jan. 10	Jan. 11	Jan. 12	Jan. 14	Jan. 15
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	51.25	51.15	51.15	....	50.70	50.55
Zinc, East St. Louis	3.75	3.75	3.75	3.75	3.75	3.75
Zinc, New York	4.10	4.10	4.10	4.10	4.10	4.10
Lead, St. Louis	3.55	3.55	3.55	3.55	3.55	3.55
Lead, New York	3.70	3.70	3.70	3.70	3.70	3.70

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, virgin 99 per cent plus, 19c. to 22c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 14.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	52.50c. to 53.50c.
Tin, bar	54.50c. to 55.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.25c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	31.00c. to 32.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	53.75c.
Tin, bar	55.37c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.50c. to 5.75c.
Lead, American pig	4.70c. to 4.95c.
Lead, bar	7.75c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	58.75c.
Solder, ½ and ½	32.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.50c.	6.25c.
Copper, hvy. and wire	5.37½c.	5.87½c.
Copper, light and bottoms	4.37½c.	4.87½c.
Brass, heavy	2.87½c.	3.50c.
Brass, light	2.12½c.	2.87½c.
Hvy. machine composition	4.37½c.	4.87½c.
No. 1 yel. brass turnings	3.75c.	4.25c.
No. 1 red brass or compos. turnings	4.00c.	4.50c.
Lead, heavy	2.62½c.	3.00c.
Zinc	1.87½c.	2.25c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

Scrap Sales Totaled 10,000,000 Tons In 1934

APPROXIMATELY 10,000,000 tons of scrap iron and steel were collected, prepared and sold by the scrap iron dealers of the United States during 1934, to the iron and steel industries of this and other countries for remelting and other purposes, it was estimated by Benjamin Schwartz, director general of the Institute of Scrap Iron and Steel, at the opening of the seventh annual convention of the institute on Jan. 15. Although this was an increase over 1933, 1934 sales were less than 50 per cent of the total handled by scrap dealers in 1929. The 1934 total included approximately 1,800,000 tons or approximately 18 per cent, exported from this country to the steel industries of England, Poland, Italy, Canada, Japan and other countries.

Scrap has played an important part in the reemployment of people, in substantial revenue for the railroads and in the conservation of natural resources, it was stated by Mr. Schwartz. From the point of view of labor, the classification of the scrap, cutting it up at dealer's yard, and otherwise preparing it in accordance with steel mill specifications, represents over 3,000,000 man-days of employment during 1934. Behind the yard workers there is a vast army of collectors who are continually engaged in picking up the miscellaneous scrap from countless sources, all of whom depend upon this waste material for a living.

Carnegie Metallurgical Board to Meet

REPORTS on metallurgical investigations conducted at the Carnegie Institute of Technology, Pittsburgh, during the past year will be presented at the eighth annual open meeting of the Metallurgical Advisory Board on Feb. 8 at Pittsburgh.

Dr. John Johnston, director of the department of research and technology, United States Steel Corpn., will preside at the morning session, and Dr. Frank N. Speller, chairman of the advisory board and director of the department of metallurgy and research, National Tube Co., Pittsburgh, will give the opening address.

Progress made by the metals research laboratory at Carnegie Institute of Technology in theoretical investigations will be reported by the director, Dr. R. F. Mehl. Dr. F. M. Walters, Jr., formerly of the metals research staff, will offer a final report on the alloys of iron, manganese and carbon. Dr. Cyril Wells, also of the metals laboratory, will explain the preparation and properties of high purity iron and will report on a study of the constitution and properties of a pure sample. The final report of the morning session will be read by B. N. Daniloff, research fellow, on "The Effect of Deoxidation on the Aging of Mild Steels."

H. W. Graham, general metallurgist of the Jones & Laughlin Steel Corpn., will preside at the afternoon session. Dr. Charles H. Herty, Jr., formerly research director for the Metallurgical Advisory Board and now with the Bethlehem Steel Co., will report on all the studies which were made under his direction at Carnegie. These reports will conclude the program of research on the physical chemistry of steel-making which has been carried out for the past eight years by the advisory board. The subjects of Dr. Herty's reports include, "The Effect of Deoxidation on the Impact Strength of Carbon Steels at Low Temperature," "Rate of Transformation and Grain Sizes," "Deoxidation of Steel," and "The Control of Iron Oxide in the Basic Open-Hearth Process."

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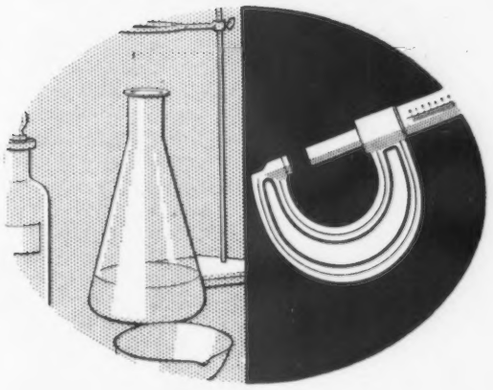

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OBITUARY

FRANCIS J. OTTIS, founder and president of the Northern Malleable Iron Co., Saint Paul, Minn., died on Jan. 5. He received his early formal education in the public schools of Nebraska and then was graduated from Creighton University at Omaha. He later received a law degree from Harvard and practiced law in New York for a short time before going to Saint Paul. He founded the Northern Malleable Iron Co. in 1906.

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JOSEPH A. MACKELL, for 22 years identified with the Pittsburgh Rolls Corpn., Pittsburgh, died at his home near Harrisville, Pa., Jan. 4, aged 60 years. He has been in the sales department of the company for the past 12 years.

❖ ❖ ❖

WARREN F. PERRY, former steel plant executive, industrial tax expert and since 1930 executive secretary of the Ohio Manufacturers' Association, died in Cleveland, Jan. 8. He was at one time secretary and assistant superintendent of the Ohio works of the Carnegie Steel Co. in Youngstown and later assistant to the president of the Briar Hill Steel Co., serving in that capacity until this company was absorbed by the Youngstown Sheet & Tube Co. in 1923.

❖ ❖ ❖

ROBERT P. SMITH, works manager of the axle plant of the Eaton Mfg. Co., Cleveland, and well known automotive engineer, died Jan. 6, aged 62 years. Formerly he was connected with the Natonal Cash Register Co., Dayton, and the Burroughs Adding Machine Co., Detroit, where he was credited with the development of various products, and later with the General Motors Corpn., Detroit. He had been in charge of the Eaton plant in Cleveland for eight years.

❖ ❖ ❖

HENRY SEWARD WILCOX, retired president of the Troy Laundry Machinery Co., died recently at Lakeville, Conn. Mr. Wilcox went to Chicago in 1901 as treasurer and general manager of the Laundry Machinery Co. and was made president in 1913. He retired 10 years ago.

❖ ❖ ❖

JOHN A. MATHEWS, vice-president and director of research of the Crucible Steel Co. of America, and a noted figure in the development of tool and special alloy steels, died of heart disease at his home in Scarsdale, N. Y., on Jan. 12. He was born in Washington, Pa., May 20, 1872, and attended Washington and Jefferson College. After receiving his A.M. and Ph.D. degrees at Columbia University, he was appointed assistant in assaying and tutor in chemistry there. In 1901 he went to the London School of Mines on receipt of the Andrew Carnegie Research Scholarship of the Iron and Steel Institute of Great Britain. The following year he became identified with the Crucible Steel Co. and continued as metallurgist and assistant manager of the Sanderson works until 1908, when the left to become general manager of the Halcomb Steel Co., of which he was later president. In 1920 he returned to the Crucible company as vice-president and director of research. Doctor Mathews was a member of many technical societies, including the British Iron and Steel Institute, American Society for Testing Materials and American Society for Metals. During the war he served on several techni-

Dr. J. A. MATHEWS

cal committees, especially in aircraft production problems, and was chairman of the aircraft engine forgings committee.

❖ ❖ ❖

HERBERT P. RANNEY, one of the founders and for several years president, Bettcher Mfg. Co., Cleveland, died Dec. 29, aged 61 years. He was vice-president of the company at the time of his death.

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WILLIAM H. WINSLOW, a pioneer Chicago manufacturer of ornamental iron and brass fittings, died recently at his farm residence near South Haven, Mich. He was born in Brooklyn and his first job was with the Hecla Iron Works of New York City. He was president of the Architectural Iron League of Chicago in 1900 and in 1905 he was chosen president of the National Architectural Iron League.

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DAVID R. BOWEN, vice-president of the Farrel-Birmingham Co., Inc., Ansonia, Conn., whose death was mentioned in these columns last week.

PERRY D. MACKAY, who long was identified with the steel industry, died on Jan. 10 at Collingswood, N. J. He was 68 years old. His steel career began in the Bessemer department of the old Bellaire, Ohio, works. He was the first superintendent of the Bessemer plant of the old Republic Iron & Steel Co., Youngstown, and was later connected with the Colorado Fuel & Iron Co.; Illinois Steel Co., Gary works, and Bethlehem Steel Co. He built and operated the Cleves, Ohio, plant at the Phoenix Horseshoe Co.

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JOHN E. WETZEL, vice-president, Superior Steel Corpn., Pittsburgh, was killed instantly in an automobile accident near Philadelphia on Jan. 12. He was 49 years of age. For 19 years associated with the Superior Steel Corpn., he served as district sales manager, sales manager and vice-president, successively. Prior to his connection with Superior he had been with Henry Disston & Sons, Inc., Philadelphia, and Sweet's Steel Co., Williamsport, Pa.

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FRANK G. WRIGHT, formerly vice-president and general manager of Ohio Steel Foundry Co., Lima, Ohio, died Jan. 11, aged 63 years.

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CHARLES A. LAPHAM, assistant chief engineer of the Chicago, Milwaukee, St. Paul & Pacific Railway Co., died Jan. 8 of a heart attack, at the age of 78 years. He was born in Milwaukee, the son of Dr. Increase Lapham, pioneer Wisconsin railroad builder, and had been connected with the engineering department of the Milwaukee Road since 1879 after engineering studies at the University of Wisconsin.

❖ ❖ ❖

CHARLES BOLTZ, president of the Milwaukee Aluminum & Brass Foundry Co., Milwaukee, died recently at the age of 64 years. He had been ill six months. Mr. Boltz was born in Rome, Wis., went to Milwaukee in 1890 and established the foundry business in 1905.

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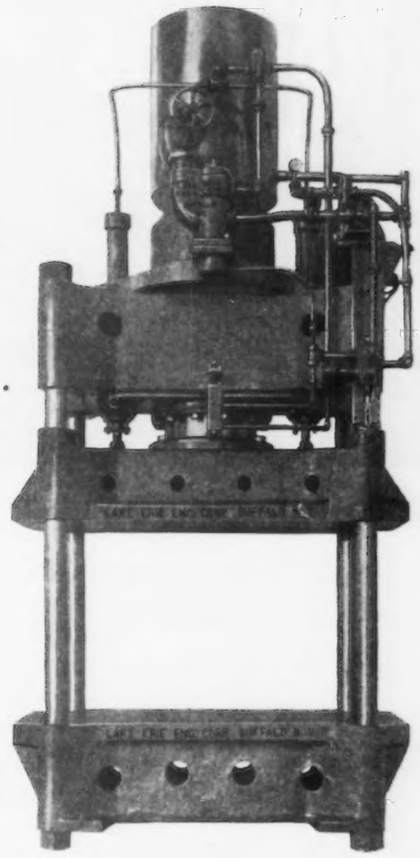

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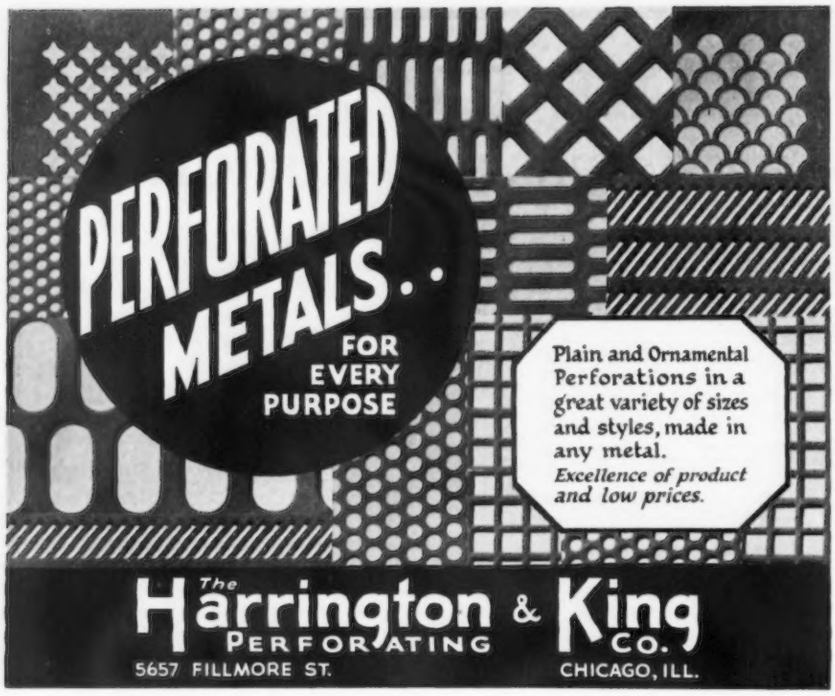
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Conveyor Transportation in Continuous Strip Mills

(Continued from Page 30)

ers. These coilers make the coils with the core axis vertical and deliver to cooling conveyors leading to coil storage.

Handling Strip Through Pickling

When coils are required for pickling in the continuous pickling process, they are removed from the hot coil storage by a crane magnet and are placed on a roller storage conveyor leading to the continuous pickle line. These coils thus deposited are automatically removed from this bank storage by a mechanical turn-over device that discharges the coil with core horizontal upon a troughed roller conveyor. It travels along this to a spring-cushioned stop and is there rolled off the conveyor by a mechanical tilting discharge. At this point the coil is in position with the pickling line and in front of the decoiler ready for uncoiling. Suitable bed rollers are provided at the decoiler to support the coil while unwinding. Coils can be released from storage by actuating an electric push-button control for the motor.

Strip is handled through continuous pickling in a continuous and endless piece. As a coil is unwound in the decoiler the tail end is either welded, riveted, or clipped to the outside end of the following coil. At the far end of the pickling tanks the strip is again coiled and the connections separated by shears or torch.

If horizontal coilers are employed, the coil is kicked out upon a skidway connecting a line of troughed roller conveyor. From there it travels to storage or to the cold roll department. Along its travel it passes over a scale where the weight is checked and recorded. If several crane bays are to be reached, intermediate tilting discharge devices are provided. Braking and stopping mechanism is included at discharge points at the scale and at the end of the line.

Similar lines of troughed roller conveyor are provided in the cold roll department for delivering coils from storage to cold roll mills. Brake equipment and a tilting discharge is used at the end of this conveyor to make delivery to the mill decoiling reel. Although there are several types and methods of continuous strip cold rolling, a typical and satisfactory method consists of a two-stand tandem coil strip mill with a decoiler at one end and a coiler at the other, and with sticker and intermediate feeding rolls and guide equipment to hold the strip.

Coiled cold roll strip may again be put into coil storage or delivered direct to edging and stripping shears and for cutting to short lengths. Where sheets are cut to length they are stacked in piles 18 in. to 24 in. high and carried to finished sheet storage and to shipping departments.

Handling Sheets in Normalizing

Sheets that are to be normalized are also passed to conveyors leading to the normalizing furnace. Separate sheets are handled through this continuous furnace, each being carried by a rider sheet. After passing through the furnace these sheets continue over a live roller conveyor table at the end of which a double-deck live roller arrangement separates the normalized sheets from the rider sheet. The normalized sheet passes over the higher level and the rider sheet is pulled off at one side of this double level portion. Rider sheets are returned by chain conveyor to the receiving end of furnace and used again.

Conveyors used for hot coil handling may be of different types, depending upon the manner in which they are handled at the coilers or by the cranes or on the way they are to be handled in the succeeding operation. For coils with core axis vertical five general types are used:

1. Roller conveyor with horizontal rollers spaced on close centers are often applied advantageously with auxiliary brake devices to permit stopping of coils at desired locations.
2. Apron conveyors consisting of heavy structural bars connecting two strands of chain to form a continuous carrying surface. The chains may be of the roller chain type with rollers spaced between side bars at joints of links, to reduce friction, or may be of the drag chain type with the chains riding on a supporting trough of anti-friction rollers. Separate troughs are used for each strand of chain, each with the rollers spaced on centers that are less than the pitch of the chain links. With this construction, the coefficient of friction is considerably reduced over the roller chain types, thereby requiring less power for equivalent lengths of conveyor.
3. A third type consists of a combination of roller conveyor and chain conveyor, the construction providing two rows of rollers with a single strand of chain supported on a frame between the rows of rollers. To offset the action of hot coils, the rollers are provided with Nitralloy bearings. The chain is provided with suitable pusher lugs to engage the coils through the core and to propel them over the roller surface. Intermittent travel of the chain and suitable discharge of coil on to conveyor permits engagement of pushers with the core.
4. Two strands of heavy drag chain may also serve as a conveying means for coils. As with the apron type

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conveyor a bed of rollers may be provided to support the chain.

5. Live roller tables with rollers spaced on close centers have also been applied for this purpose. Because of the low initial cost, low maintenance and elimination of power cost, gravity conveyors are frequently used where conditions are suitable. With gravity conveyor, both straight and curved directions of travel are equally convenient.

Handling Horizontal Coils

For the handling of coils with the core axis horizontal there are but three types in general use today:

1. Gravity conveyor having two rows of rollers set at a 10 deg. to 12 deg. angle from the horizontal to form a vee trough for supporting the coil. Because of the troughed construction it is suitable only for straight-line travel.
2. Where conveying around curves is necessary in addition to straight line travel, a gravity conveyor having a bed of near horizontal rollers and a near vertical roller guard has proved very satisfactory. With this construction the conveying surfaces of rollers are set at an angle of about 4 deg. off the horizontal with the cross-section of the conveyor. A guard rail of rollers vertical to the conveying rollers is necessary to retain the coil on the conveyor. This really is a modification of the above-mentioned trough type conveyor. When negotiating curves the vertical guard is on the inside of the curve.
3. When chain conveyors are applied to handling horizontal coils, the apron type is most suitable. However, it is necessary that the carrying surface be provided with a concave surface or with suitable retaining lugs or cradles to prevent coils from rolling off conveyor. The chains may be constructed and supported same as with other apron types.

In this day and age, conveyors are serving in practically every class of industry handling articles weighing fractions of ounces, such as radio parts, to foundry molds weighing up to 10,000 lb., or coils and stacks of steel strips or sheets weighing up to 40,000 lb. Many plants today are taking full advantage of conveyor possibilities. Although steel mills are not as yet fully conveyorized, the writer has selected this subject because of the industry's leadership in our industrial life.

Cast Iron Pipe

Bangor, Me., has awarded 100 tons of 8-in. pipe to R. D. Wood & Co.

Reading, Mass., has placed 100 tons of pipe with United States Pipe & Foundry Co.

Southwest City, Mo., plans 13,000 ft. of 2 to 6-in. for water supply; also 50,000-gal. tank and tower. A. C. Moore, Fourth and Duquesne Streets, Joplin, Mo., is consulting engineer.

Smithfield, R. I., plans water pipe lines in East Smithfield. Fund of $187,000 has been arranged through Federal aid. Power Service Corpn., Hospital Trust Building, Providence, R. I., is consulting engineer.

Harrodsburg, Ky., will soon ask bids for water pipe lines. Fund of $35,000 is available. H. B. Cassin, Citizens Building, Louisville, is consulting engineer.

Board of District Commissioners, District Building, Washington, asks bids until Jan. 23 for 2400 ft. of 30-in., and eight tons of specials.

Spokane, Wash., plans replacement of existing old mains. Cost about $45,000. A. D. Butler is city engineer.

Board of Supervisors, Amherst County, Amherst, Va., will ask bids soon on water pipe line system at Madison Heights, Va.

Richwood, Ohio, will soon take bids for pipe for water distribution; also for 100,000-gal. elevated tank and tower, and pumping plant. Fund of $80,000 has been arranged. Burgess & Nipple, 568 East Broad Street, Columbus, Ohio, are consulting engineers.

Mansfield, Ark., closes bids Jan. 29 for pipe for water distribution system; also for filtration works and pumping station, storage reservoir, etc. Fund of $56,000 has been arranged. W. L. Winters, Fort Smith, Ark., is consulting engineer.

Department of Property and Supply, Harrisburg, Pa., asks bids until Jan. 23 for water pipe line system at State property at Mansfield, Pa., including steel standpipe.

Waldo, Wis., plans about 8000 ft. of various sizes for water supply; also new pumping plant. Robert Cramer & Sons, 647 West Virginia Street, Milwaukee, are consulting engineers.

Dubuque, Iowa, will soon take bids for pipe for water mains to cost about $20,000. John McEvoy is superintendent of waterworks, City Hall.

Oakland, Cal., has taken bids on 239 tons on which United States Pipe & Foundry Co. is low bidder.

San Rafael, Cal., will take bids Jan. 21 on 113 tons of 6 to 8-in.

Los Angeles Department of Water and Power opens bids Jan. 21 on 295 tons of 16-in.

Pasadena, Cal., will open bids Jan. 21 on 186 tons of 6 and 8-in.

Pipe Lines

Fallbrook Irrigation District, Fallbrook, Cal., is considering steel pipe line for main trunk water line for San Luis Rey River water project. Work will include Diesel-electric generating plant for power supply for series of electric-operated pumping stations, booster plants, steel tanks, etc. Financing in amount of $1,100,000 is being arranged. Willis S. Jones, Claremont, Cal., is consulting engineer.

Southern Indiana Gas & Electric Co., Evansville, Ind., will install about 6000 ft. of 6-in. steel pipe for gas distribution in Lodge, Taylor and other streets.

Canton, Miss., has low bid from Allegheny Steel Co. for steel pipe for natural gas distribution at $65,563. Municipal Service Co., Kansas City, Mo., is low bidder at $49,101 for pipe line installation, including cast iron mains, for which low bid has been received from United States Pipe & Foundry Co., at $20,334.

Arkansas-Louisiana Gas Co., Shreveport, La., recently organized by D. W. Harris, Shreveport, and associates, with capital of $12,000,000, is considering steel pipe extensions for connection between systems of four gas utilities which will be consolidated in new organization, including other pipe lines for expansion in natural gas distribution. Companies to be merged include Southern Cities Distributing Co., Public Utilities Corpn. of Arkansas, Arkansas-Louisiana Pipeline Co., and Reserve Natural Gas Co. R. W. Curran, Little Rock, Ark., is one of organizers.

Dominion Natural Gas Co., Hespeler, Ont., plans steel pipe lines for local distribution. Cost over $40,000.

United States Engineer Office, Navy Building, Washington, asks bids until Jan. 24 for four 18-in. cast steel pipe castings (Circular 981).

Frederick Snare Corpn., New York, general contractor, has placed 600 tons for Tygart River Dam, Grafton, W. Va., with National Tube Co.

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Fabricated Structural Steel

Awards Decline—New Projects Also Lower

LETTINGS of 9750 tons include two Government dams, one at Guttenberg, Iowa, in the Mississippi River, requiring 2500 tons of structural steel and 1400 tons of sheet piling, the other at Grafton, W. Va., in the Tygart River, calling for 1300 tons of structural steel and 1500 tons of sheet piling. Other awards were mostly in small tonnages. New projects of 19,700 tons compare with 25,950 tons last week. Among the largest new jobs are 5500 tons for the Grand Coulee dam at Almira, Wash., on which bids are expected soon, and 3000 tons for the Ashland Avenue bridge in Chicago. Plate awards total about 1050 tons. Plate projects, at 7425 tons, include 5000 tons for the Grand Coulee dam. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Holyoke, Mass., 130 tons, Northampton Street bridge, to American Bridge Co.

New York, 100 tons, building at Forty-second Street and Third Avenue, to George A. Just Co.

Unadilla, N. Y., 260 tons, State highway bridge, to Harris Structural Steel Co.

Great Bend, N. Y., 250 tons, State highway bridge, to McClintic-Marshall Corpn.

Pompton Plains, N. J., 790 tons, two State highway bridges, to American Bridge Co.; 240 tons through Franklin Contracting Co., 550 tons through Tidewater Store & Supply Co.

Beggsville, Pa., 170 tons, State highway bridge, to McClintic-Marshall Corpn.

SOUTH AND SOUTHWEST

Grafton, W. Va., 1300 tons for Tygart River dam; placed by Frederick Snare Corpn., New York, with American Bridge Co.

Grafton, W. Va., 1500 tons of sheet steel piling for Tygart River dam; placed by Frederick Snare Corpn., New York, with Carnegie Steel Co.

State of Georgia, 620 tons, highway bridges, to Austin Brothers Bridge Co.

Gassaway, W. Va., 300 tons, highway bridge, to Midland Structural Steel Co.

Kingfisher County, Okla., 130 tons, bridge, to Capital Iron Works Co.

CENTRAL STATES

Youngstown, Ohio, 120 tons, Republic Steel Co. building, to Truscon Steel Co.

Cincinnati, 195 tons, Clopay Corpn. building, to R. C. Mahon Co.

Winnebago County, Ill., 200 tons, highway bridge, to Midland Structural Steel Co.

Des Moines, Iowa, 670 tons, post office addition, to Hansell-Elcock Foundry Co.

Reno County, Kan., 860 tons, bridge at Hutchinson, to Kansas City Structural Steel Co.

Guttenberg, Iowa, 1400 tons sheet piling, dam across Mississippi River, to Inland Steel Co.

Guttenberg, 2500 tons, for dam, to R. C. Mahon Co.

WESTERN STATES

Boulder Dam, Nev., 650 tons, cylinder hoists and bulkhead gates, 500 tons to Consolidated Steel Corpn. and 150 tons to Bethlehem Steel Co.

Yellowstone National Park, Wyo., 250 tons, utility and apartment buildings, to an unnamed bidder.

Los Angeles, 135 tons, water stops for Department of Water and Power, to Southwest Welding & Mfg. Co.

Camarillo, Cal., 100 tons, State hospital buildings, to Consolidated Steel Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Worcester, Mass., 400 tons, hospital units.

Exeter, R. I., 150 tons, State service building.

New York Central Railroad, 1500 tons, bridges, West Fifty-Fourth to West Sixty-Fourth Streets, New York.

Pittsburgh, 300 tons, building annex at Mayview Hospital.

De Ruyter, N. Y., 130 tons, grade school; bids Jan. 17.

SOUTH AND SOUTHWEST

Chesapeake & Ohio Railway, 175 tons, bridge at Richmond, Va.

Texas County, Okla., 250 tons, bridge.

Marinette, Ariz., 500 tons, bridge.

Phoenix, Ariz., 500 tons, post office; bids about Feb. 15.

CENTRAL STATES

Cleveland, 500 tons, eight post office buildings in Cleveland and nearby territory.

Durand, Mich., 200 tons, bridge.

Calumet City, Ill., 400 tons, school.

State of Illinois, 125 tons, highway bridge, A. C. Woods Construction Co., contractor.

Joliet, Ill., 800 tons, bridge for Santa Fe Railroad.

Chicago, 3000 tons, Ashland Avenue bridge.

State of Illinois, 1025 tons, bridges.

State of Indiana, 950 tons, bridges.

State of Minnesota, 150 tons, bridges.

St. Louis, 7,000 tons, post office superstructure; bids about April 1.

State of Missouri, 900 tons, highway bridges; bids to be called Jan. 26.

Topeka, Kan., 350 tons, bridge.

State of Kansas, 430 tons, bridges.

WESTERN STATES

Washington and Yuma Counties, Colo., 147 tons, State highway bridge and overhead crossing; bids Jan. 22.

San Francisco, 1250 tons, Trans-Bay bridge East Shore highway distribution structure; bids about March 1.

Almira, Wash., 5500 tons, Grand Coulee dam; bids soon.

FABRICATED PLATE

AWARDS

Jamaica, N. Y., 250 tons, standpipes, to Chicago Bridge & Iron Works.

Tampa, Fla., 280 tons, tank, to Chicago bridge & Iron Works.

Evanston, Ill., 510 tons, elevated tank, to Chicago Bridge & Iron Works.

NEW PROJECTS

San Francisco, 1500 tons, Hetch Hetchy pipe line trans-bay crossing; bids about Feb. 1.

Eureka, Cal., 800 tons of 10-gage sheets for pipe line, alternates on concrete and wood; bids about Feb. 15.

Almira, Wash., 5000 tons, Grand Coulee dam; bids soon.

Los Angeles, 4000 tons, welded steel pipe for Department of Water and Power, Specification No. 1588; bids recalled and job will be readvertised.

Torrance, Cal., 120 tons, tank, no bids received, contract will be readvertised.

NEW DATA SHEETS

ON

HY-TEN, ECONOMO, & S. A. E. STEELS

WHEELOCK, LOVEJOY & COMPANY, Inc.

CAMBRIDGE CHICAGO CLEVELAND DETROIT

Fixtures Facilitate Welding Of Large Parts

(Concluded from Page 21)

of a lathe tailstock, and mounted between these centers, the parts to be welded, can be rotated on their longitudinal axis through 360 deg. The front center is provided with an index plate and locking pin to permit spacing at 2 deg. intervals. The standard fixture of this type is 19 ft. long.

The welding of a huge bed which measures 10 ft. x 6 in. x 23 ft. long and weighs 27,163 lb., is shown in Fig. 4. In this case no fixture is used, the piece being positioned on angle irons fastened to a floorplate. Except for several small castings, the piece is of rolled steel throughout. Parts are first tack welded together to form the complete piece, and are then finish welded in the set-up here shown. When the lower half is finish welded, the piece is turned around by means of an overhead crane, and the upper half finish welded. A crew of four welders work simultaneously. A supply of welding electrodes is kept in a convenient holder beside the welding operator as shown at the extreme right in this view. This piece requires the welding of approximately 1800 ft. of seam, 1660 lb. of heavily coated electrode being used in welding the entire frame. After welding the piece is stress relieved in an annealing furnace. All welding is by the arc process, P & H Hansen arc welders manufactured by the company being employed.

Reinforcing Steel

Awards 4100 Tons—New Projects 25,100 Tons

Hartford, Conn., 150 tons, filtration plant, to Carroll-McCreary & Co., Inc.

Passaic and Morris Counties, N. J., 160 tons, Pompton River bridge, to an unnamed bidder.

Grafton, W. Va., 1750 tons, rail steel, Tygart River dam, to Carnegie Steel Co.; Frederick Snare Corpn., New York, general contractor.

Grafton, W. Va., 100 tons for Tygart River dam; placed by Frederick Snare Corpn., New York, with West Virginia Rail Co.

Cleveland, 150 tons, West Side sewage disposal plant, to Patterson-Leitch Co.

Chicago, 130 tons, Ninty-fifth Street bridge, to an unnamed bidder.

Fargo, N. D., 300 tons, sewage disposal plant, to Concrete Steel Co.

Guttenberg, Iowa, 900 tons, dam across Mississippi River, to Inland Steel Co.

San Francisco, 225 tons, Lawton school, to Gunn-Carle Co.

Long Beach, Cal., 100 tons, Locust Avenue school, to an unnamed bidder.

Honolulu, T. H., 112 tons, two Kress stores, to Pacific Coast Steel Corpn.

NEW REINFORCING BAR PROJECTS

Taunton, Mass., 165 tons, State hospital.

Worcester, Mass., 100 tons, hospital units.

New York, 1000 tons, three projects covering track depressions and elevations of New York Central Railroad; bids in Jan. 15, 18 and 29.

Kings and Queens Counties, New York, 320 tons, grade separations; general contract bids being taken.

State of Illinois, tonnage being estimated, bridges; bids to be opened Jan. 18.

Chicago, tonnage being estimated, four postal substations; bids to be opened Feb. 4.

Chicago, 200 tons, retaining walls at Ashland Avenue.

Jackson, Mich., 690 tons, sewage disposal plant.

San Francisco, 1500 tons, Trans-Bay bridge east shore highway distribution structure; bids about March 1.

San Francisco, 250 tons, Trans-Bay bridge subway under Southern Pacific tracks; bids about Feb. 21.

Los Angeles, 150 tons, school at Newport Beach.

Los Angeles, 5660 tons, billet and rail steel bars for Metropolitan Water District, Specification M-2037; bids Jan. 16.

Los Angeles, 100 tons, William McKinley school; general contract awarded.

State of Colorado, 100 tons, highway work in three counties; bids Jan. 22.

Santa Monica, Cal., 100 tons, Outlook building; general contract awarded.

Camarillo, Cal., 150 tons, State hospital buildings; bids under advisement.

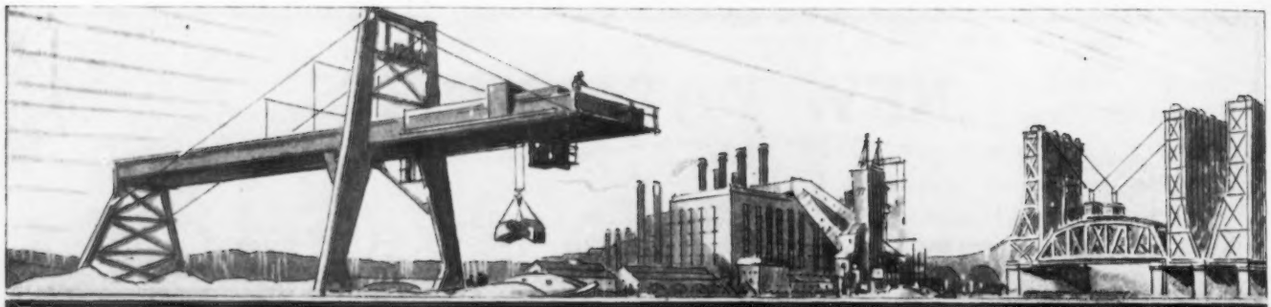
Almira, Wash., 14,617 tons approximately, Grand Coulee dam; bids soon.

Machine Tool Orders Largest Since 1930

DOMESTIC orders for machine tools in December were the largest since 1930, according to the National Machine Tool Builders' Association, Cleveland. The association's index, based on the volume of shipments in 1926, stood at 51.5 last month, compared with 43.1 in November. The foreign index rose from 9.3 to 14.6, and the combined index, at 66.1, represented a 27 per cent increase over the previous month.

Distribution of orders was also much better than has been the case in previous months of the year. The number of companies reporting business equal to or better than an average month in 1926, almost doubled, jumping from 19 to 34.

The average monthly index for the year just ended was 46.2, representing a volume of orders equal to about 61 per cent of the average experience of the previous 15 years. The 1933 index was 27.1, compared with 19.6 in 1932, 41.0 in 1931 and 70.9 in 1930. The percentage of foreign orders declined sharply in 1934 to 20.6 per cent, compared with 34.3 per cent in the previous year, 32.5 per cent in 1932 and 34.1 per cent in 1931.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Demand Well Ahead Of December — Inquiry Improved

DEMAND for machine tools thus far in January is running considerably ahead of the first half of December. Buying is well diversified and it is probably significant that the automobile industry is furnishing much less than its usual share of orders. While a Cincinnati maker has taken an order for six grinders from a Detroit company, the only other important business coming from that source this year has been from Ford.

Automobile companies are placing a larger percentage of the tools for their foreign plants with builders in the countries in which the plants are located. It is estimated, for instance, that not more than 10 per cent of the tools recently purchased by Ford for foreign use will come from the United States. The motor car industry is also building more of the parts for its foreign units in its plants abroad.

NEW ENGLAND

Dahlquist Mfg. Co., 36 West Third Street, South Boston, manufacturer of metal products, brass and copper goods, etc., has let general contract to Blake & Pope Co., 38 Chauncy Street, Boston, for one-story foundry addition. Cost about $25,000 with equipment.

Fillkwik Co., Attleboro, Mass., manufacturer of metal goods, has leased about 30,000 sq. ft. additional space in local building for expansion.

Coastal Oil Terminal Co., Salem, Mass., care of S. Burwen, Hotel Edison, 1 Bank Square, Lynn, Mass., head, recently organized, plans new bulk oil storage and distributing plant on Misery Island, Salem. Cost over $50,000 with tanks and other equipment.

Monarch Chemical Sprinkler Corpn., Fairfield, Conn., has been organized by John L. Seat, Fairfield, and William Gardiner, 44 Morningside Drive, New York, to manufacture sprinklers and sprinkling equipment.

American Metal Crafts Co., Attleboro, Mass., manufacturer of metal plated products, etc., has leased additional space in neighboring factory for expansion.

Photo-Electric International Corpn., Boston, has been organized by Edward J. Newman, 137 Webster Street, Arlington, Mass., and associates, to manufacture electrical specialties.

Old Colony Coal & Wharf Co., 114 State Street, Boston, has leased dock property at Cedar Creek, Bridgeport, Conn., for new coal storage and distributing plant. Elevating, conveying, loading and other equipment will be installed. Cost over $45,000 with equipment.

NORTH ATLANTIC

Continental Can Co., 1 Pershing Square, New York, is arranging for purchase of site at Elwood, Ind., for new multi-unit plant, work to begin early in spring. Cost over $400,000 with equipment.

Hupp Oil Burner Co., Inc., Brooklyn, has been organized by Gilbert and David Huppert, 251 Prospect Avenue, to manufacture oil burners and oil-burning equipment.

Macklin Brothers & Bassow, Inc., 423 Morris Avenue, New York, scrap iron and metals, has filed plans for two one-story buildings for new storage, bundling and distributing plant, installation to include crane, hoists, bundling equipment, loaders, etc. Cost close to $60,000 with equipment. Frederick J. Fox is company architect.

Quartermaster Supply Officer, Army Base, Brooklyn, asks bids until Feb. 4 for two dry tumbler machines and one press (Circular 190).

Wisser Oil Co., Inc., Fifth Avenue and Williamson Street, East Rockaway, L. I., plans rebuilding part of oil storage and distributing plant recently destroyed by fire, including six oil tanks.

Davies Air Filter Corpn., New York, has been organized by Charles Davies, 390 Fourth Avenue, and associates, to manufacture air filters, ventilating equipment, parts, etc.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 22 for galvanized steel expanded metal (Schedule 4061) for Brooklyn, Portsmouth, San Diego and Mare Island navy yards.

Schenley Distillers Corpn., 20 West Fortieth Street, New York, plans new four-story storage and distributing building at plant at Lawrenceburg, Ind. Cost over $150,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer. Company has begun erection of similar units at plants at Frankfort, Ky., and Pepper Distillery, Lexington, Ky., to cost close to like amounts with equipment.

C. I. Ginsberg, 131 West Twenty-first Street, New York, manufacturer of textile machinery and parts, has leased space in building at 135 West Twentieth Street for new machine works.

Department of Docks, Pier A, North River, New York, will soon let general contract for new two-story pier sheds on Pier 45, Tenth Street and North River. Cost about $1,280,000 with mechanical-handling, loading and other equipment.

Black Prince Distilleries, Ltd., Schiedam, Holland, care of John Reid, Jr., of Butler, Wyckoff & Reid, 20 Exchange Place, New York, representative, has purchased three-story factory, totaling about 45,000 sq. ft. floor space, with power house and other structures on 3-acre tract at Nutley, N. J., and will remodel for new distilling and rectifying plant for production of gin and other liquors. Cost over $75,000 with machinery.

Edeo, Inc., Vineland, N. J., has been organized by Philip L. Lipman, Vineland, and associates, to manufacture metal products.

Mathieson Alkali Works, Inc., Lincoln Building, New York, has arranged for purchase of about 16 acres of waterfront property on Kill von Kull, Elizabethport, N. J., with ship basin, dock and other structures formerly used for ship terminal, and will remodel for new bulk storage, distribution and shipping plant.

Carrier Corpn., 850 Frelinghuysen Avenue, Newark, N. J., operating Carrier Engineering Corpn., same address, manufacturer of air-conditioning equipment, parts, etc., has arranged financing in amount of $1,000,000, part of fund to be used for expansion.

Borough Council, Woodbine, N. J., is considering new municipal electric light and power plant. Cost over $100,000 with equipment. Nathaniel Rosenfeld, mayor, is active in project.

Ralston Purina Co., 835 South Eighth Street, St. Louis, manufacturer of cereals, etc., has leased former storage building of Pennsylvania Railroad, Wilmington, Del., and will remodel for new branch mill. Cost over $60,000 with machinery.

OHIO AND INDIANA

Bonnar-Vawter Fanform Co., 6605 Clark Avenue, Cleveland, manufacturer of blanks for teletypes, calculating machines, etc., has leased one-story factory on East Thirtieth Street, formerly occupied by Morgan Lithograph Co., totaling 75,000 sq. ft. floor space, and will remodel for new plant. Present works will be removed to new location and capacity increased.

Universal Houses, Inc., Zanesville, Ohio, care of Edward L. Garrett, Zanesville, president, recently organized, is considering one-story plant at Frazeysburg, Ohio, where site is being secured, for manufacture of standardized steel houses.

United States Engineer Office, Zanesville, Ohio, asks bids until Jan. 31 for construction of Clendening dam, including power house, crane, trolley and chain hoist installation, conduits for electric lines, metal works, etc. (Circular 49).

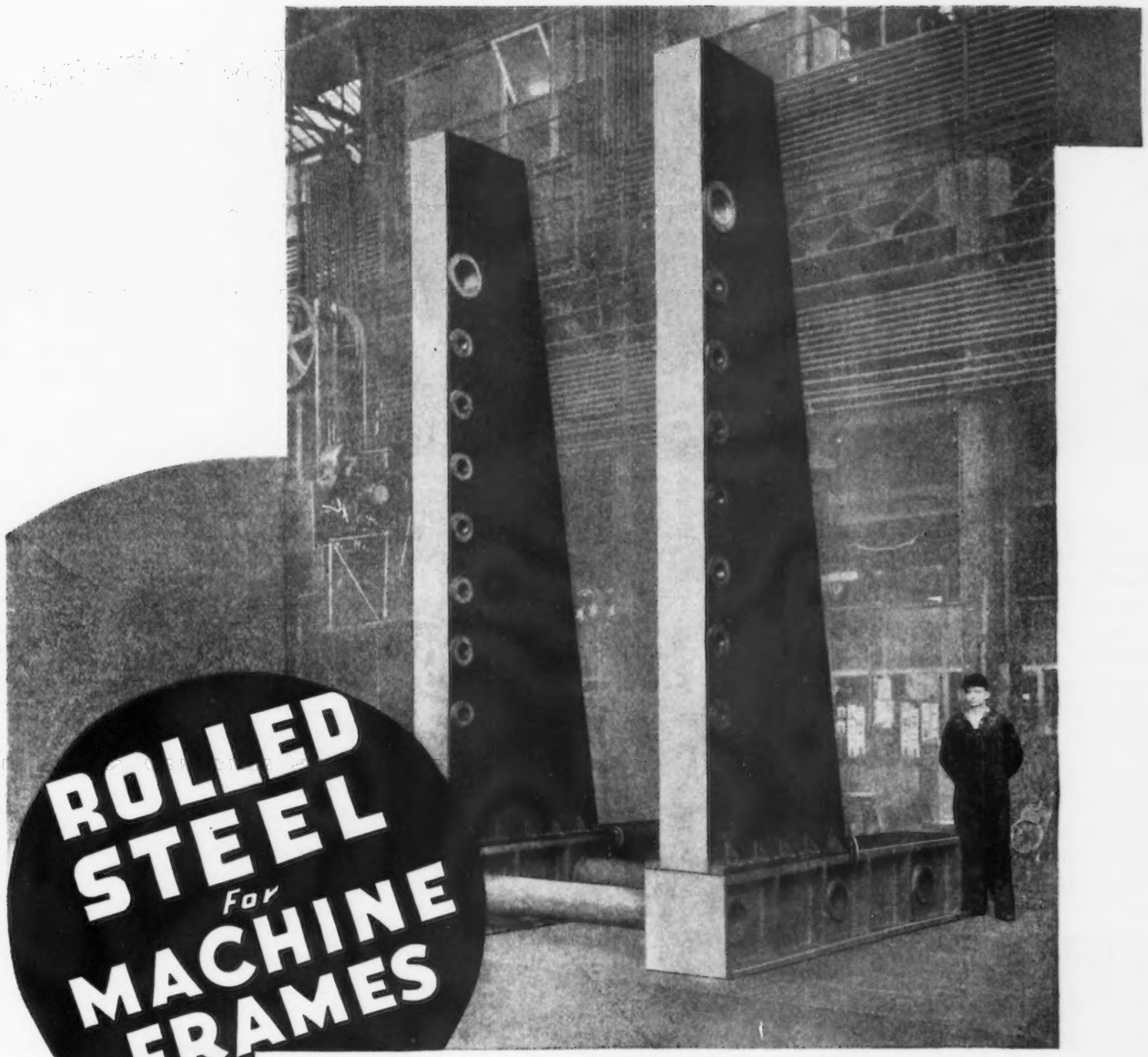
Ray-O-Vac Co., Madison, Wis., manufacturer of mechanical equipment, has purchased plant and business of Lancaster Carbon Co., Lancaster, Ohio. Lancaster plant, totaling about 70,000 sq. ft. floor space, will be continued as branch factory of first noted company.

River Transportation Co., 5297 Lower River Road, Delhi, Cincinnati, plans new coal tipple on Ohio River, near Anderson's Ferry. Cost over $25,000 with equipment.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Jan. 28 for generator assembly (Circular 408); until Feb. 1, 332 airspeed indicator assemblies (Circular 415), one structural steel test jig (Circular 419); until Feb. 4, turn indicator assemblies, flight indicator assemblies and tube assemblies; until Feb. 28, pump assemblies (Circular 382).

Carson-Haymond Industries, Inc., 301 Medical Arts Building, Indianapolis, has been organized by C. Roscoe Haymond and Ray G. Carson, 2124 Broadway, to manufacture metal products.

Reliance Art Metal, Inc., Cincinnati, recently organized by S. C. Dreher, president, G. M.



ROLLED STEEL For MACHINE FRAMES

WHEN you use rolled steel for machine frames, you always have just the weight and strength you need, without excess.

Whether it's a frame welded up from ½-in. plates or from 6-in. plates, it can be designed solely to meet the requirements of the product itself... without costly concessions to production limitations.

Often the adoption of rolled steel eliminates many items of expense, reduces the amount of machining required, reduces weight by employing heavy construction only where it is needed to meet heavy stresses.

ROLLED STEEL OFFERS THESE ADVANTAGES

1. Cheaper . . . for most parts.
2. Reduces loss due to defects or discards.
3. Permits inexpensive changes in design.
4. Faster production . . . particularly of new and unstandardized parts.
5. Reduces inventory and pattern storage.
6. Permits prompt adaptation of standard design to special requirements.
7. Eliminates excess weight.
8. Modernizes appearance.

ILLINOIS STEEL COMPANY

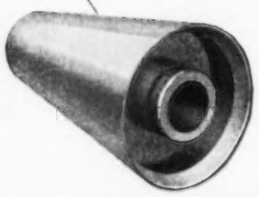
208 SOUTH LA SALLE STREET, CHICAGO, ILLINOIS

United States Steel Corporation Subsidiary

ICE BOATING is one of old man Winter's speediest sports. With full sail set, this swift craft skims over the glassy surface like a huge snowbird taking wing.

The keen-edged boat runners carve out their course across the ice as easily and smoothly *as an automatic tool machining Ultra-Cut Steel.* For here is a modern screw stock that challenges comparison for fast cutting, smooth machining and clean finishing for turned, bored or threaded parts.

Write for new folder No. 3-A which tells how Ultra-Cut is increasing production 30% to 40% or more, and doubling tool life in scores of machining operations.



ULTRA-CUT STEEL

replaced drop forgings for making these cones for textile machines, resulting in lower cost and better finish. Time per piece 56 seconds. Speed 188 S.F.M. using 2-5/16" round Ultra-Cut.

BETTER MADE STEELS LABORATORY TESTED

COLD DRAWN BARS
AND SHAFTING
EXTRA WIDE FLATS
SPECIAL SECTIONS
ALLOY STEELS

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* **BUFFALO, N.Y.**

Castelline and C. Bader, is operating a plant at 1107 Jackson Street, for manufacture of architectural metal products.

WASHINGTON DISTRICT

Virginia Fruit Brandy Distilling Corpn., 721-29 Central National Bank Building, Richmond, Va., recently organized, plans new distillery at North Garden, Va., where site has been acquired. Plant will include power house, machine shop and other units. Cost close to $100,000 with machinery. P. Lester Hawks, Dixie Building, Greensboro, N. C., is engineer. R. T. Lipscomb, 1117 West Avenue, Richmond, will be plant manager.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Feb. 4 for storage batteries, filter cartridges and other supplies (Circular 97); until Feb. 5, piston turning and grinding machine, gear pullers, gasoline pumps, pressure gages, grease gun, wrenches, etc. (Circular 96).

United States Engineer Office, Navy Building, Washington, asks bids until Feb. 6 for two steel barges, 100 ft. long, 30 ft. wide.

Harford Pure Rye Distillers, Inc., Garrett Building, Baltimore, has let general contract to P. J. Murray Contracting Corpn., 382 Fourth Avenue, New York, for new distillery at Havre de Grace, Md., with power house and machine shop. Cost over $150,000 with machinery.

General Purchasing Officer, Panama Canal, Washington, asks bids until Jan. 23 for steel welding rods, one electric drying oven, four current transformers, two chain hoists, carriage bolts, machine screws, nuts, spring lock washers, nails, socket wrenches, flexible copper cord and other equipment (Schedule 3024).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 22 for welding rods (Schedule 4075), steering gears (Schedule 3981), meters (Schedule 3998), 175 crucibles without covers (Schedule 4056), pig and sheet lead (Schedule 4063); until Jan. 25, special steel shapes (Schedule 4079), sheet steel (Schedule 4057) for Eastern and Western navy yards; until Jan. 22, about 10,000 steel boiler tubes (Schedule 4064) for Norfolk, Mare Island and Puget Sound yards.

BUFFALO DISTRICT

Great Lakes Macaroni Corpn., Buffalo, Thomas Viviano, president, recently organized to manufacture food products, has leased space in local Larkin Terminal, 680 Seneca Street, for new plant.

Rochester Gas & Electric Co., 89 East Avenue, Rochester, N. Y., plans new transmission line to Webster, N. Y., and vicinity. Cost about $55,000 with equipment.

Clancy Mfg. Corpn., Syracuse, N. Y., has been organized by George L. Scherrer, 305 Sedgwick Drive, and Charles E. Tompkins, 125 Clifton Place, to manufacture tools and other mechanical equipment.

WESTERN PA. DISTRICT

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, has plans for expansion at branch plant at Henryetta, Okla., including three buildings for general sheet glass production, storage and distribution. Cost over $350,000 with machinery. A. B. McClure is superintendent at local plant.

Schenley Distillers Corpn., Schenley, Pa., plans multi-story addition for storage and distribution. Cost close to $150,000 with conveying, loading and other equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer. Company headquarters are at 20 West Fortieth Street, New York.

SOUTH ATLANTIC

Standard Brands, Inc., 595 Madison Avenue, New York, and 116 S. W. Nineteenth Avenue, Miami, Fla., manufacturer of food products, has let general contract to William H. Gold Co., Security Building, Miami, for one-story factory branch, storage and distributing plant at First Street and Nineteenth Avenue. Cost close to $30,000 with equipment. J. Murray Dixon, 1623 Michigan Avenue, Miami Beach, is architect.

Beverage Mixer Co., Tallahassee, Fla., has been organized by B. L. and O. S. Nussbaum, Tallahassee, to manufacture mixers and parts, and kindred mechanical equipment.

Georgia Power Co., Atlanta, Ga., is arranging appropriation of about $10,000,000 for extensions and improvements in plants and system, including transmission and distribution lines, substations and other operating structures.

Dillon Plow Co., Inc., Dillon, S. C., has been organized by W. A. and J. D. Blizzard, Dillon, to manufacture plows and other agricultural implements.

Hudson Silk Hosiery Co., Inc., North Brevard Street, Charlotte, N. C., plans steam power house at proposed new multi-unit knitting mill in Oakhurst district, where 8-acre tract has been purchased. A machine shop will also be installed. Cost over $100,000 with machinery.

MIDDLE WEST

Philip Blum & Co., Inc., 1100 West Washington Street, Chicago, liquor products, has leased a five-story building at Louisville, and will remodel for branch storage and distributing plant. Cost over $30,000 with equipment.

Chicago Gravel Co., 343 South Dearborn Street, Chicago, plans new unloading, storage and distributing terminal on deep waterway, Dresden Heights, near Joliet, Ill. Cost close to $100,000 with conveying, elevating and other mechanical-handling equipment.

Franklin Stamping Corpn., 622 West Lake Street, Chicago, has been organized by Morton J. Franklin and associates, to manufacture metal stampings and kindred metal products.

Board of Public Utility Commissioners, City Hall, Rochester, Minn., will soon take bids for addition to municipal electric light and power plant, for which fund of $100,000 has been arranged, including equipment. L. A. Cowles, 310 North Broadway, is plant superintendent.

Dominion Electrical Mfg. Co., 712 Ontario Avenue, Minneapolis, manufacturer of electrical appliances and equipment, is considering establishment of branch plant at Mansfield, Ohio, where property is being secured. Cost over $60,000 with equipment. W. H. McClelland is works manager.

Department of Water, City Hall, Dubuque, Iowa, is considering installation of 1,000,000-

Pittsburgh PREFERRED FOR OUTSTANDING PERFORMANCE

Records of service extending over long periods of time have convinced many engineers of the outstanding ability of Pittsburgh Seamless Boiler Tubes to stand up under severe stresses. The preference these operators show for "Pittsburgh" Seamless products is a result of proved performance.

PITTSBURGH STEEL COMPANY

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New York Detroit Chicago St. Louis
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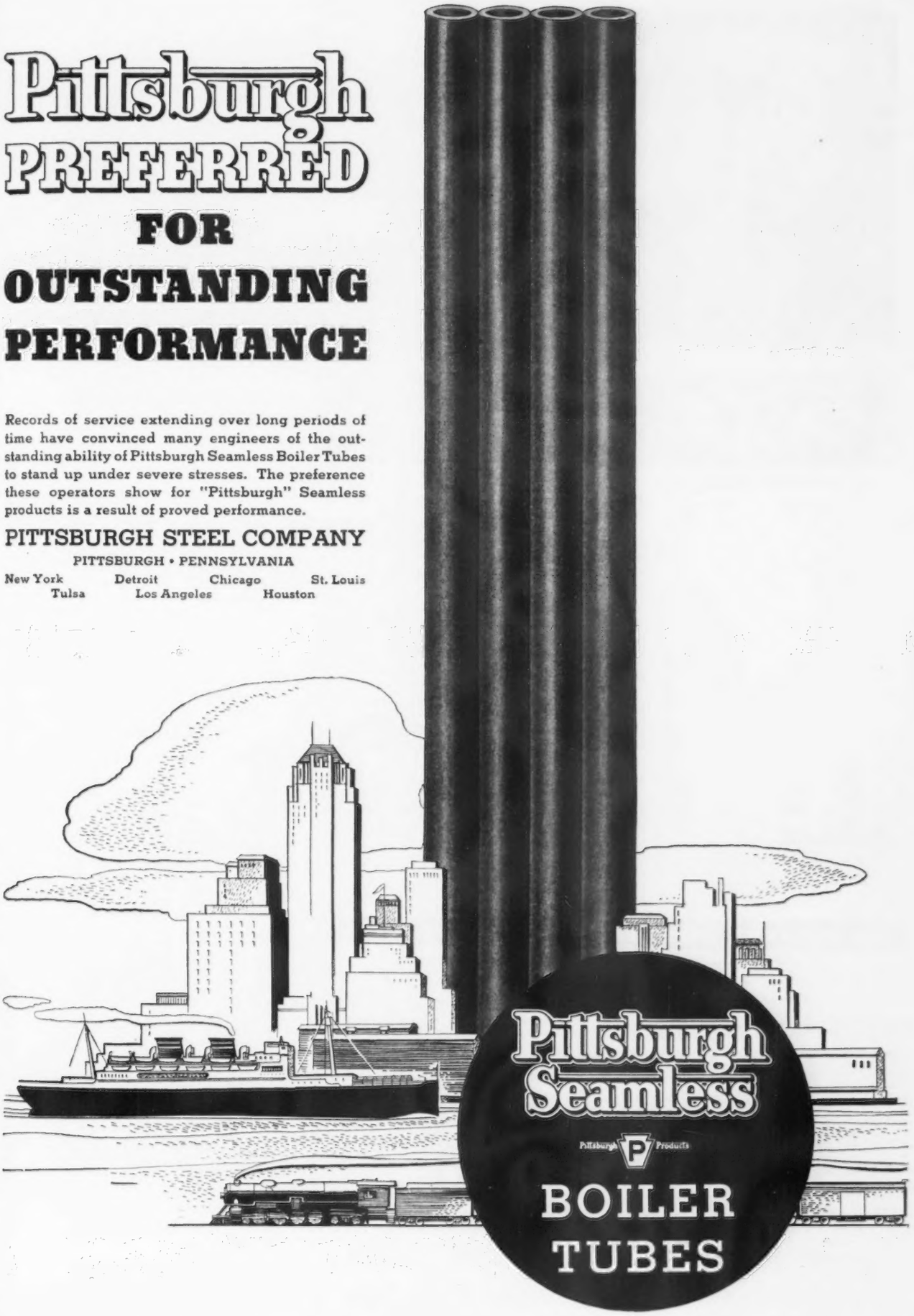


A Heritage of Quality . . . .

ASCO FORGING BILLETS

From the time the charge is placed in the furnace until the "Asco" Special High Grade Forging Billet is delivered to the customer, the Andrews Steel Company never loses sight of the fact that the billet, to be useful to industry, must be converted into a forging.

That the finished forging may give the utmost in service over the longest period of time, it is vital that the forging billet possess outstanding characteristic qualities.

To that end every "Asco" Special High Grade Forging Billet is subjected to the most exacting, split-hair laboratory control through every step in production. Half measures are not tolerated. Rigid adherence to established high standards is mandatory!

Because of this heritage of quality, you too, should use "Asco" Special High Grade Forging Billets and Slabs. They add extra value to your forgings!

Our Metallurgical Laboratories are at your service in developing special steels for special purposes.

THE ANDREWS STEEL CO., NEWPORT, KENTUCKY

Carbon, Chrome, Chrome Molybdenum, Chrome Nickel, Chrome Vanadium, Molybdenum, Nickel, Nickel Molybdenum, Vanadium Billets and Slabs.

gal. elevated steel tank and tower for water system. J. W. McEvoy is superintendent.

Minnesota Mining & Mfg. Co., 791 Forest Street, St. Paul, Minn., manufacturer of abrasive materials, has plans for additions to raw material plant at Wausau, Wis., including one-story unit, 30 x 300 ft., for storage and distribution, equipped with 200 steel bins, belt elevators, conveyors and other equipment. Cost over $125,000 with machinery. Toltz, King & Day, Inc., Pioneer Building, St. Paul, is architect and engineer.

Ruemelin Mfg. Co., 1570 South First Street, Milwaukee, manufacturer of sand blasting equipment, dust arrestors, etc., has incorporated without change of name. A new factory 80 x 120 ft., to include power plant and offices, is being built at 3860 North Palmer Street.

Fairbanks, Morse & Co., 900 South Wabash Avenue, Chicago, has placed contracts for addition and general modernization of steel foundry shop at main works at Beloit, Wis., at cost of $75,000 or more.

Board of Vocational Education, Superior, Wis., has commissioned Roland C. Buck, Inc., consulting engineer, 919 Tower Avenue, to design $150,000 addition, 88 x 140 ft., three stories and basement, to present vocational school. Work will start about March 15.

Twin-Flex Corpn., Detroit, manufacturer of axles, auxiliary transmissions and four-wheel drives for light motor trucks, has completed transfer of plant and offices to Milwaukee, occupying space at 2021 South Fifty-fourth Street. Line of products is being extended. E. M. Schultz is secretary and treasurer.

Standard Foundry Co., 1600 Kewaunee Street, Racine, Wis., has placed general contract with Nelson Co., Yout Street, for modernization of foundry. A. A. Wickland Co., Chicago, is consulting engineer.

MICHIGAN DISTRICT

Vickers, Inc., 1400 Oakman Street, Detroit, manufacturer of pumping machinery and parts, valves, etc., has taken out permit for one and two-story addition, 165 x 200 ft., for which general contract was recently let to J. A. Utley, 6031 Mansur Street. Cost over $85,000 with equipment.

Trenton Valley Distillers Corpn., Trenton, Mich., has plans for two additions, two and three stories, 50 x 150 ft., for bottling unit, and one-story, 75 x 212 ft., for storage and distribution. Cost over $75,000 with equipment. George F. Diehl, 120 Madison Avenue, Detroit, is architect.

Remco, Inc., 534 South Woodward Avenue, Birmingham, Mich., has been organized by H. B. Hazerodt, P. O. Box 308, Birmingham, and associates, to manufacture tools and other mechanical specialties.

John Bean Mfg. Co., Lansing, Mich., manufacturer of spraying equipment, parts, etc., subsidiary of Food Machinery Corpn., San Jose, Cal., will soon begin superstructure for one-story addition, for which general contract was recently let to H. G. Christman Co., Lansing, Mich. Cost close to $30,000 with equipment.

SOUTH CENTRAL

Bonnie Brothers, 127 West Main Street, Louisville, has awarded general contract to H. G. Whittenberg, 3133 South Third Street, for five new buildings at distilling plant, including three-story fermenting unit, 90 x 118 ft.; dryer building, 30 x 75 ft.; two one-story storage and distributing buildings, 28 x 60 ft., and 35 x 60 ft., and one-story power house. Cost close to $100,000 with equipment. Thomas J. Nolan, Kentucky Home Life Building, is architect.

Caldwell Stone Co., Danville, Va., has acquired property of Kentucky River Quarry Co., near Boonesboro, and will develop for new stone quarry, with installation of new crushing, loading and other equipment. Cost about $35,000.

Bernheim Distilling Co., 1701 West Breckinridge Street, Louisville, has superstructure under way for new eight-story storage and distribution plant. Cost about $100,000 with mechanical-handling and other equipment. Leslie V. Abbott, 8 Kenwood Village, Louisville, is architect.

Tennessee Electric Power Co., Chattanooga, Tenn., is arranging appropriation of $1,300,000 for extensions and improvements in power plants and system, including transmission and distribution lines, substations, equipment buildings and other structures.

SOUTHWEST

Arkansas Power & Light Co., Pine Bluff, Ark., plans extensions in transmission and distributing lines to rural districts in several counties in State, including substation facilities. Over 3000 miles of power lines will be built. Cost close to $5,000,000 with equipment.

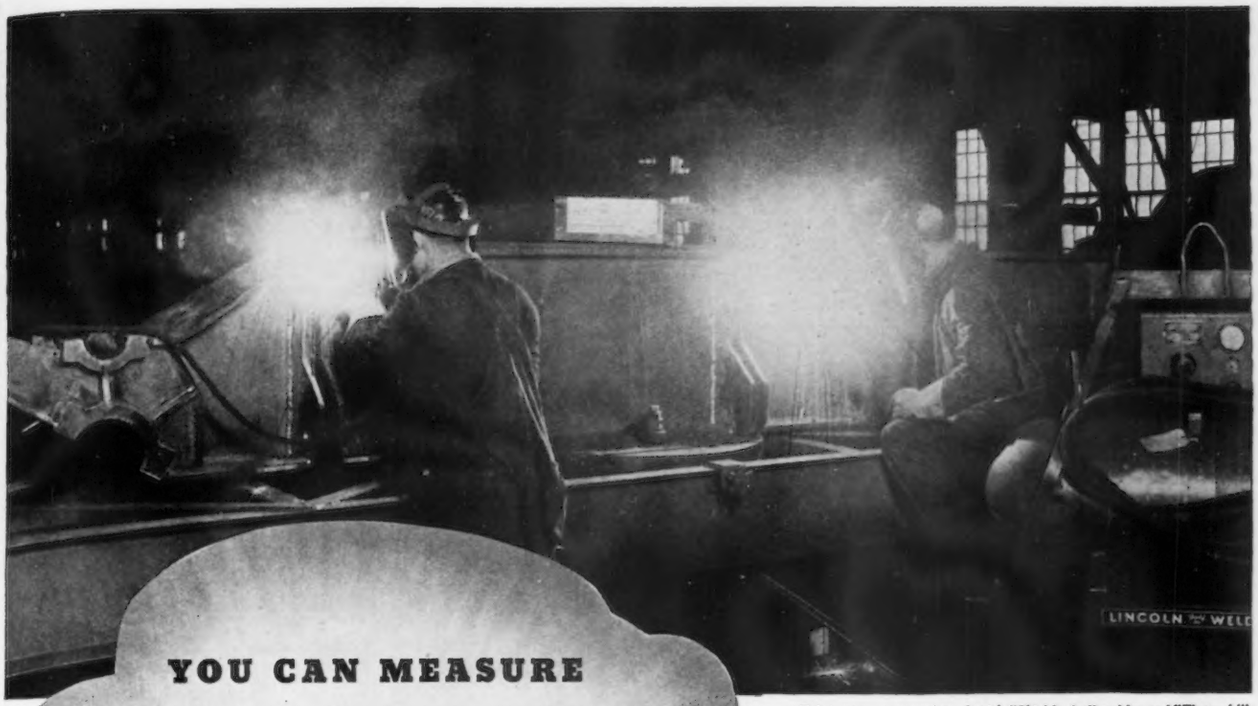
Moog-St. Louis Spring Co., 3135 Washington Avenue, St. Louis, manufacturer of steel springs for automobiles, motor trucks, etc., has taken over factory at St. Louis Avenue and Kingshighway, for new branch plant for manufacture of piston rings and allied specialties. Present Washington Avenue factory will be continued as heretofore.

Town Council, Mansfield, Ark., asks bids until Jan. 29 for pumping machinery and accessories, filter equipment, pipe lines, etc., for municipal waterworks. Fund of $56,000 has been arranged. Winston-Lee-Winters, Merchants Bank Building, Fort Smith, Ark., are consulting engineers.

Magic Pump & Mfg. Co., Tulsa, Okla., has been organized by A. G. W. Biddle and W. L. Eagleton, McBrome Building, to manufacture pumping machinery and kindred equipment, parts, etc.

Laclede Power & Light Co., 1017 Olive Street, St. Louis, will carry out expansion at electric light and power plant at Mount and Wharf Streets, to double present capacity. Two 15,000-kw. generator units and accessories, three 1350-hp. boilers, pumps and other equipment will be installed. First extension, referred to in these columns last week, costing $200,000, will be used for steam department; other units will be started closely following. Complete project will cost about $1,500,000 with machinery. Management & Engineering Corpn., 900 South Boyle Street, St. Louis, and 327 South La Salle Street, Chicago, is consulting engineer.

Standco Oil Tools, Inc., Houston, Tex., has been organized by C. W. Handlip and R. F. Davis, 1610 West Duffie Street, to manufacture oil well-drilling tools and kindred mechanical equipment.



Fabricating crane end truck with "Shield-Arc" welder and "Fleetweld" electrodes in plant of Shaw-Box Crane & Hoist Co., Muskegon, Mich.

YOU CAN MEASURE

PROFIT

BY THE POUND

. . . OR by the foot or by the kilowatt hour when you weld with a *"Shield-Arc."* As measured by any of these units, *"Shield-Arc"* is guaranteed to produce more welding per dollar. Check into *"Shield-Arc's"* more uniform current, higher efficiency, high capacity, and its eight other features . . . then you'll learn more than any advertisement can ever tell you how *"Shield-Arc"* drops costs and raises profits.

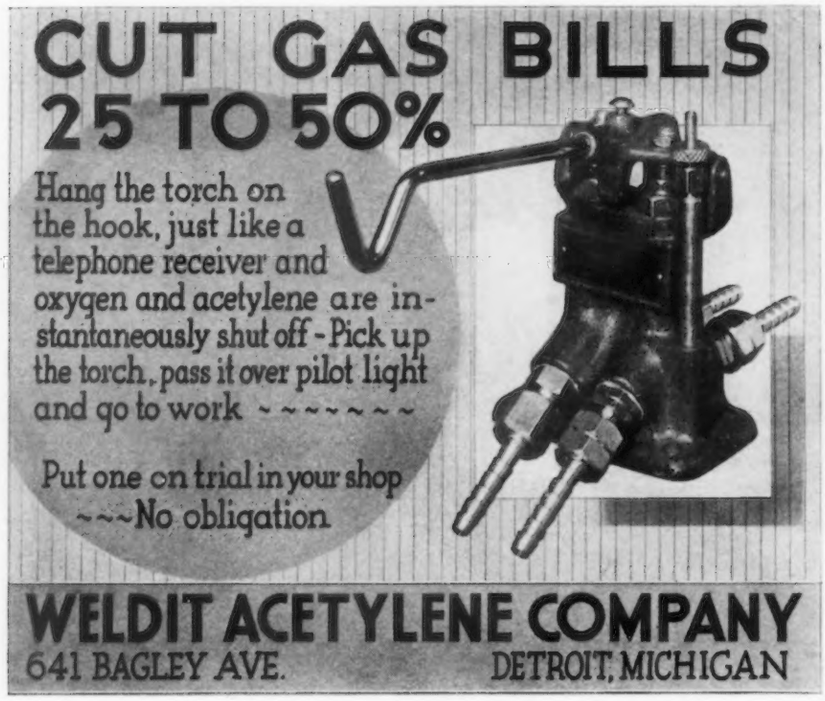
"Shield-Arc's" faster welding proved to one manufacturer that he had been tossing away $6.50 every day he used an old type welder. Find out now how much a *"Shield-Arc"* can save you. Ask The Lincoln Electric Company, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

LAD "Pop, I've got two tickets for the Follies tonight."

POP "No, thanks—take your girl. I've seen my follies for today. I found we were coupling our plant water lines, and with a Lincoln *'Shield-Arc'* welder right on the production floor, that could do the job better at a good fourth less. Believe me, I fixed that foolishness." W-96

LINCOLN

"SHIELD-ARC" WELDERS



How Attractive Finish Helps Metal Products Sales

(CONCLUDED FROM PAGE 26)

condensation with each other, prevents the embrittlement so common with the usual drying oils.

Price Is Not Paramount

In any problem of selection it must be borne in mind that the price of the enamel itself is only a partial element of the overall cost. Coverage, ease of application, ease of repair or touch-up, and freedom from after-troubles such as printing, marring, and discoloration are often of far more importance economically. Lack or high cost of baking facilities, size of the metal itself, or fire hazard due to location of the finishing department are other factors which may limit the choice in some cases.

A still further factor is that of desired color. Some of the enamels are receptive to certain dyes and not to others, and where it is important to get an exact shade or to maintain certain color standards an enamel must be selected accordingly. For specialty work such as wood graining and marble effects, special drying or baking conditions may be called for. For a smooth surface the condition of the metal before painting is important although in some cases a few extra coats of enamel may be less expensive than machining or otherwise preparing the metal surface.

Fine copper wires used in the electrical industry may pass 20 times or more through the dip tank and the automatic oven in the enameling process. Automobile bodies usually receive not less than five coats, and three coats are standard for the synthetic enameling of refrigerators. Where primers and surfacers are used they must be properly designed with reference to each other and with the finishing enamel in order to avoid disturbance in the system. In most cases this is not difficult and different types of synthetics may be used. It is necessary, however, to consider the inter-relations of the coatings on the basis of some special characteristics. Thus it is frequently advisable to secure all coating materials for any one job from the same manufacturer.

A RECENTLY published book which should be of considerable value to steel metallurgists is Alloys of Iron and Copper, by Gregg and Daniloff published for the Engineering Foundation by the McGraw-Hill Book Co., Inc., New York. This fourth volume of the alloys of iron monograph series includes all the published articles of importance as well as many heretofore unpublished data on alloys of iron and copper. The continuity of this latest work is excellent. First the constitution of iron-copper alloys is discussed, after which considerable attention is given to the constitution of iron-copper-carbon alloys. The remainder of the book includes information on the melting and working of copper irons and steels, the effect of copper on the characteristics and physical properties of iron and steel, the precipitation hardening of copper steels, mechanical properties of copper bearing wrought iron and cast steel, properties of wrought copper steels, corrosion resistance of copper steel and iron, and copper in cast iron.

Improved Crawler Type Tractor

THE Bates Manufacturing Co., Joliet, Ill., builder of the Bates steel mule tractor has announced a new model-35 in which, it is said, the clutch is held in proper clutch rotating balance through supporting the weight of the main engine clutch parts midway between two bearings. The transmission gear shaft, extending from the clutch, is supported on two bearings, one of which is the same bearing as is used on the clutch shaft. A gear-

type coupling is incorporated between the clutch shaft and transmission shaft to obtain flexibility between the two members and to proportionately load the bearing.

Grinding Wheels.—Safety Grinding Wheel & Machine Co., Springfield, Ohio, Catalog No. W-34. This covers processes and materials used in the manufacture of grinding wheels, lists and gives dimensions of standard type wheels. Grinding wheel specifications for most common grinding operations and other valuable data are included.

Plate and Sheet Metal-Working Machinery.—Streine Tool & Mfg. Co., Minster, Ohio. Catalog. Illustrates and gives specifications covering line of Stamco shears. Continuous automatic mill shearing equipment, corrugating, crimping and other types of metal-forming machinery are shown. Tables covering gages for sheets and plates, weights of sheet copper, tin plate data and other information are also included.

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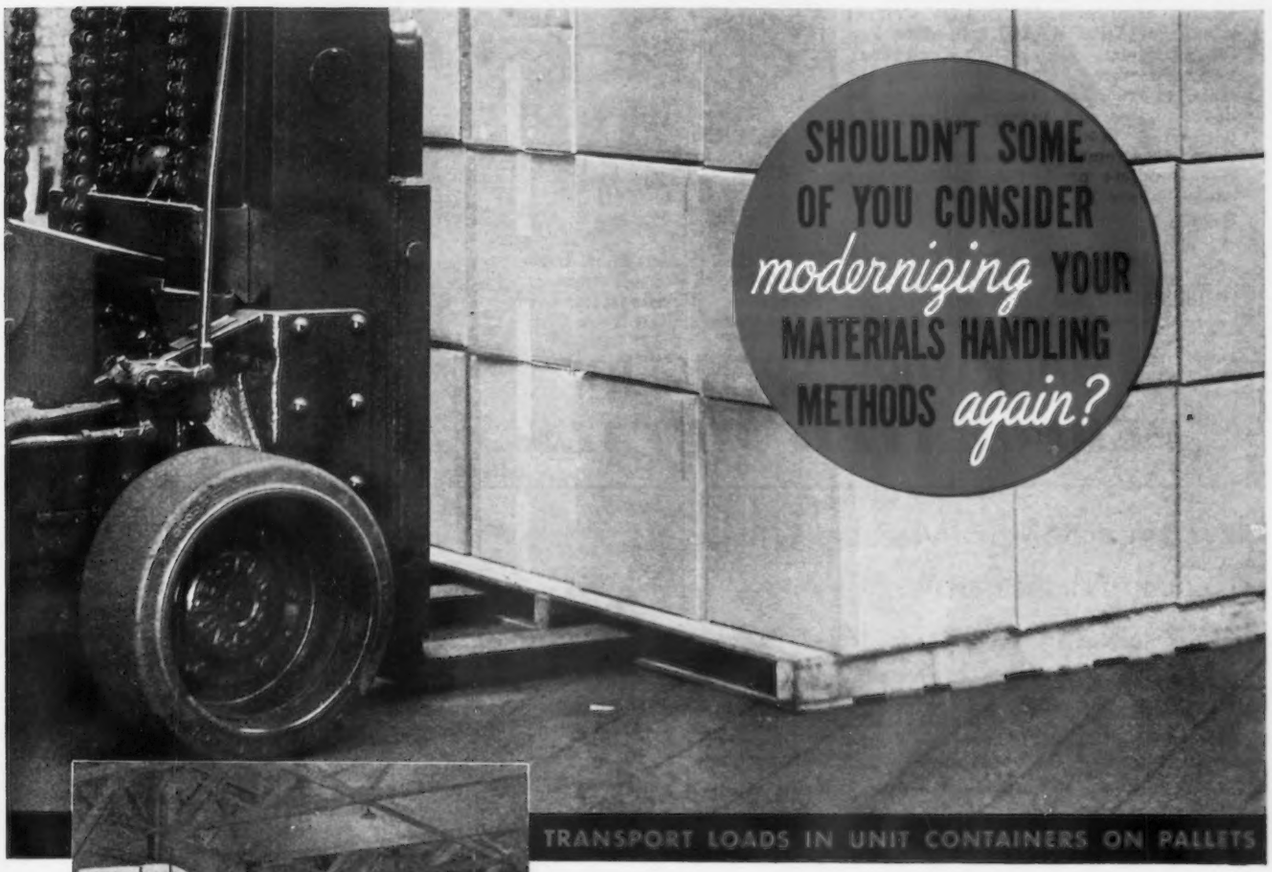

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WICKWIRE SPENCER
PERFORATED METALS

New Type Solvent Machine Used To Clean Metal Parts

(CONCLUDED FROM PAGE 31)

either two or three chambers. The first chamber contains the boiling solvent and the second chamber (known as a rinse chamber) the distilled solvent. If the machine is of the three-chamber type, the third chamber contains only the vapors. The immersion type of machine is recommended where foreign matter other than oil or grease is present and can be removed by the boiling action of the solvent. The work is placed in the boiling solvent, which gives a mechanical action for the removal of the foreign matter. After the work has been in the boiling chamber for some time, it is immersed in the clean distilled solvent, which removes part of the oil carried over on the work from the boiling chamber. When the temperature of the work becomes lower than that of the boiling solvent or vapor, it is then placed in the vapors in the third chamber or in the vapors above the boiling liquid in the first chamber. The vapor cleaning action removes the last traces of oil and the work may be taken out clean and dry. The immersion-type machine, with three stages of cleaning, is ideal where the cleaning must be perfect, such as in plating, painting, enameling, etc.

In some cases the boiling solution does not give sufficient mechanical agitation to remove the foreign matter or shop dust from crevices or indentations of the metal. When this occurs, the boiling solvent is pumped or sprayed onto the work under sufficient pressure to remove the foreign matter when the oil and grease are dissolved, a fully automatic machine being preferred for this purpose because of the rapid production which thereby can be secured. In this type of machine the work may pass through a vapor chamber, through a boiling solvent or through a series of sprays in which the boiling solvent is pumped onto the work. After moving through the first chamber, the parts are immersed in a hot solvent rinse or the hot solvent rinse is sprayed onto the work to complete the cleaning. In each case, work leaves the machine hot, dry, and clean.

The machine may be designed for the operator to load and unload the work from the same end of the machine, or, where two operators are available, the work is loaded at one end and removed at the other end. In some cases the work passes through the machine on a continuous conveyor, the cleaning unit being only one part of a continuous production system. The automatic type of machine is best adapted for cleaning sheet steel, terne plate, refrigerator parts, cylinder blocks, racked plating work, nuts, bolts, etc.

When metal parts are best handled by tumbling, a tumbling barrel solvent machine should be employed. Parts are placed in a rotating barrel, which is lowered into the machine housing and is tumbled above the boiling solvent. The solvent vapors are condensed and collected, flowing onto the work. By this means, continuous, clean hot solvent washes the work while tumbling. After the work has been cleaned, it is removed hot and dry; however, it may be tumbled either in the vapors or above the vapors for a longer period if necessary to remove burrs or to burnish.

The solvent method is most suitable for cleaning zinc and lead, coated metals, aluminum, die castings, copper or brass parts, or other soft metals which are affected by ordinary alkali cleaners. It likewise is recommended for stampings, bolts and nuts, hardware, and refrigerator shells, prior to Bonderizing, cadmium plating, copper plating, enameling, painting, lacquering or close inspection.

A stabilized, chlorinated, compounded solvent, permanent in quality and adapted for continuous use, should be employed. This solvent, either in the vapor or liquid state, will not break down or change in the presence of moisture, vapors, or water. It is non-explosive and non-inflammable.

Due to its high wetting and dissolving properties, this solvent is many times more effective than gasoline, benzine, naphtha, oleum spirits or other solvents which cannot be safely heated or boiled. Its vapors are four and one-half times heavier than air. By means of water jackets or coils, the level of the vapors is kept considerably lower than the top of the machines, so that the vapors do not escape into the air and cause excessive loss.

By a simple means of distillation within the machines, or by the use of an outside still, the contamination of oil and foreign matter removed from the metal parts is separated from the solvent so that the solvent can be used continuously. Many of the machines are provided with storage tanks for the distilled solvent while cleaning solvent from contamination where the additional expense of an outside still is not desirable, and it is possible to shut down the machine for the removal of the contaminated materials.

The new method of cleaning by means of chlorinated solvent in solvent machines is being adopted in all lines of the metal industry, from small stamping and plating shops to manufacturers of automobiles. It reduces the cost of cleaning to a point where it is equal to or below the cost of other methods.